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New York Zoological Society Annual Report 1985-86

Profile of the New York Zoological Society

Founded in 1895, the New York Zoological Society consists today of six major divisions operating facilities in the United States and worldwide: the New York Zoological Park (Bronx Zoo); the New York Aquarium and Osborn Laboratories of Marine Sciences in Brooklyn; the Wildlife Survival Center on St. Catherines Island, Georgia; Wildlife Conservation International (WCI), headquartered at the Bronx Zoo; and the City Zoos in Central Park, Prospect Park, and Flushing Meadows Park, soon to be renovated and managed by the Society. WCI supports active research projects in countries ranging from the People's Republic of China to Belize, and maintains stations in the Kibale Forest, Uganda; Valdes Peninsula, Argentina; and Amboseli National Park, Kenya. The Society's staff of 461 in all divisions includes curators, educators, veterinarians, animal keepers, research scientists, writers, administrators, artists and designers, photographers, gardeners, technicians, and a host of other support and maintenance specialists.

The *Bronx Zoo* and *New York* Aquarium are sensitive and popular tools for teaching environmental education in the nation's urban capital. Serving a metropolitan New York population of more than 17,000,000, as well as visitors from around the world, they combine nature, recreation, and education as do no other city institutions. In particular, they seek to arouse an interest in wild creatures and to stimulate compassion for them. In recent years, the captive collections of the Zoo and Aquarium, now totaling more than 26,250 individual animals, have begun to fulfill a new, if unwanted role as long-term repositories for vanishing species, sustaining and perpetuating rare and delicate creatures which are disappearing in nature.

The *Wildlife Survival Center*, founded in 1974, is wholly devoted to the propagation and study of endangered species. Its captive breeding programs are complemented by wildlife release projects designed to reintroduce certain species to the wild.

The *Osborn Laboratories of Marine Sciences*, adjacent to the Aquarium and an integral part of its programs, has devoted its resources since 1968 to basic studies in the mechanisms of heredity, to the characteristics and cure of fish diseases (with a special view toward the application of this work to aquaculture), and to broad investigations in marine ecology.

The objective of *Wildlife Conservation International* is to save pieces of nature. WCI is the country's senior non-governmental program sponsoring international wildlife conservation and research. As George Schaller, WCI Director, has written, "We strive to obtain a better understanding of the structure, functioning and stability of large ecosystems and to apply this understanding to their conservation." WCI's distinctive approach has already contributed to the creation, enlargement, or strengthening of more than fifty reserves and parks, and to the education of many to whom the future is entrusted.

The *City Zoos Project*, now in progress, will expand the Society's public service throughout the New York metropolitan area, creating an entirely new and modern system of wildlife management and exhibition facilities, with emphasis on educational opportunities for children and adults alike. The redesigned Central Park Zoo will open in 1988.

1985–86 Highlights and Vital Statistics

Attendance at New York Zoological Society facilities reached nearly 2.9 million, with 2,267,940 at the Bronx Zoo and 621,547 at the New York Aquarium between July 1, 1985, and June 30, 1986.

Membership in the Society rose to 28,610, and more than 50,000 individuals, foundations, and corporations contributed $10,496,663 in dues, gifts, and bequests.

Born or hatched at the Bronx Zoo, New York Aquarium, and Wildlife Survival Center during calendar year 1985 were more than 1,700 mammals, birds, reptiles, amphibians, and fishes.

Noteworthy offspring included Ella, Indian rhinoceros; Tinka and Tonka, Siberian tigers; Chico, grey seal; Rocky, California sea lion; five silvered leaf monkeys; four small-clawed otters; twelve Bulwer's pheasants; eight Guam kingfishers; seven Guam rails; twenty-two radiated tortoises; fifteen Coahuilan box turtles; and ten southern stingrays.

At the end of 1985, the New York Zoological Society was responsible for 4,504 animals of nearly 750 species and subspecies at the Bronx Zoo, 271 animals of 46 species at the Wildlife Survival Center; and 21,729 animals of 315 species at the New York Aquarium. More than 250 of these species are listed as endangered or threatened in some degree.

The Bronx Zoo's Himalayan Habitat was scheduled to open in September 1986; renovation of the Elephant House began in late summer 1985; and groundbreaking for the Aquarium's Discovery Cove took place in March 1986.

Wildlife Conservation International (WCI) sponsored 59 projects in 30 countries, including new efforts in Ivory Coast, Kenya, Malagasy Republic, Rwanda, Tanzania, Zaire, Australia, Indonesia, Malaysia, Papua New Guinea, Thailand, Costa Rica, Argentina, and Venezuela.

New York Zoological Society Annual Report 1985-86

The City of New York, through its Department of Cultural Affairs, provides annual operating support for the Bronx Zoo and the New York Aquarium, both of which occupy City-owned buildings on City-owned property.

The Society also receives funds annually from the Natural Heritage Trust, a program of the New York State Office of Parks and Recreation.

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Table of Contents

Trustees and Advisors 2

Report of the President 5

Report of the General Director 9

New York Zoological Park 15
Mammalogy 15
Ornithology 17
Herpetology 19
Wildlife Survival Center 21
Animal Health 23
Zoo Education 25
Exhibition and Graphic Arts 29
Operations—Construction and Maintenance 31

New York Aquarium 33

Osborn Laboratories of Marine Sciences 38

City Zoos Project 39

Wildlife Conservation International 41
Geographic Distribution of WCI Projects 44

Public Affairs 47

Publications Department 50

Administrative Services—Admissions, Parking, and Transportation; Food and Souvenirs; Personnel 51

Publications and Papers by NYZS Staff and Associates 52

Report of the Treasurer 55
Audited Financial Statements 57

Contributions, Pledges, and Payments on Pledges 64

Committees of the New York Zoological Society 68

Staff of the New York Zoological Society 69

Report of the President

"For it was never intended, from the beginning, that the Zoological Society's interests should be bounded by the fences around the Zoo and the Aquarium." So wrote Fairfield Osborn, the Society's illustrious sixth president, in 1948, and his words continue to guide and inspire the Society's activities today.

Entering its ninety-second year, the New York Zoological Society, while firmly based at the Bronx Zoo and New York Aquarium, is more than ever involved beyond their fences. Ties between our New York bases and the worldwide efforts of Wildlife Conservation International continue to grow stronger. Educational programs, such as the Zoo's *Wildlife Inquiry Through Zoo Education*, reach tens of thousands of schoolchildren in metropolitan New York and across the country. WIZE was also recently introduced abroad, in the Central American country of Belize. In the past year, the Society has helped to formulate conservation legislation in New York State and has collaborated in saving two bird species, through captive breeding, that had become extinct on the island of Guam. The necessity for global involvement is reflected as well in the award of the Society's Gold Medal to British conservationist Dr. Norman Myers, who has done so much to broadcast the plight of the world's ecosystems and to propose action for their survival.

Even within the Zoo and Aquarium, the message is one of reaching out. In JungleWorld's first full year, nearly 700,000 people walked through its magnificent habitats and learned about the importance of saving the world's tropical forests. *Animal Kingdom*, coming into its own as one of the country's premier wildlife magazines, reached a rapidly growing audience of nearly 150,000 readers each month, including the members of 38 zoological societies around the country.

To an encouraging degree, this year of involvement has been matched by the involvement of friends and supporters of the Society. Literally extending the Society's interests beyond the fences of the Bronx Zoo and New York Aquarium is the Central Park Zoo, for which a number of generous gifts were received. Outstanding among them were Milton and Carroll Petrie's pledge of $1 million for the Tropic Zone Building, a total of $1.393 million from funds associated with the late Lila Acheson Wallace and the Reader's Digest, and a challenge grant of $400,000 from The Kresge Foundation. Other capital contributions included $250,000 from the Dunlevy Milbank Foundation for the Aquarium's Discovery Cove, and $1 million from the Robert

Ella, the first Indian rhinoceros born at the Bronx Zoo, strolls through Wild Asia's Chitawan Valley with her mother Pinkie.

Dr. Norman Myers was awarded the New York Zoological Society's Gold Medal in 1986.

Wood Johnson 1962 Charitable Trust for the Zoo's Elephant House renovation (announced in last year's report), which has kicked off the long-range renewal of Astor Court.

With a record 28,610 members and more than 50,000 contributors, the Society received $10,496,663 in dues, gifts, and bequests during the year, thanks to the efforts of the Public Affairs staff and the leadership of the Trustee voluntary committees. Chief among the latter are the Development and Conservation Committees, chaired by John Pierrepont; the Annual Patrons, co-chaired by John Chancellor and John Elliott; the Business Committee, co-chaired by Arthur Hauspurg and Peter C. R. Huang; and the Aquarium and Osborn Laboratories Planning Committee, chaired by Dr. Henry Clay Frick II.

Another capital project at the Zoo, the Himalayan Highlands, received an additional $130,000 from the Women's Committee, which had already provided a major share of funding for this exciting exhibition, scheduled to open in September. Under its new President, Mrs. Gordon B. Pattee, the Committee completed its fourteenth year of fund-raising with "Zooesta," a gala evening event attended by 500 at the Bronx Zoo.

Increased operating support reflects a growing awareness of the Society's diverse interests and involvements. Major funding was provided for the Wildlife Survival Center on St. Catherines Island in Georgia by the Edward John Noble Foundation; for Wildlife Conservation International by the Muskiwinni Foundation, the J.N. Pew Charitable Trust, the Jessie Smith Noyes Foundation, Margot W. Marsh, and the Exxon Corporation; for Zoo Education by the Geraldine R. Dodge Foundation and the Louis Calder Foundation; for Animal Health programs by the Marilyn M. Simpson Charitable Trust and the Jessie Smith Noyes Foundation; and for employee training by the DeWitt Wallace Fund. For these and other programs of the Bronx Zoo, the Aquarium, the Osborn Labs, the City Zoos, and the Society in general, there were 98 gifts, pledges, and bequests of $10,000 or more from individuals, foundations, and corporations.

The Society depends equally on government support, and particularly on its historic partnership with the City of New York, which in fiscal year 1986 provided $7,994,073 in operating funds through the Department of Cultural Affairs. New York State funding through the Natural Heritage Trust totaled $1,990,000, and the Federal government awarded $221,596 to the Society through the National Institutes of Health, the Institute of Museum Services, and the National Museum Act.

No one has been more involved in shaping the modern course of the Society than Laurance S. Rockefeller, who was first named to the Board of Trustees in 1935. As chairman of the Executive Committee from 1940 to 1968, he collaborated closely with President Fairfield Osborn, and he was subsequently named President of the Society and then Chairman of the Board of Trustees. For his fifty years of service to the Society and the cause of conservation, Chairman Rockefeller was awarded the Society's Gold Medal in 1985. At the end of that year he stepped down as Honorary Chairman of the Board, but he continues on as a Trustee, as involved and necessary as ever. Charles W. Nichols, Jr., another long-time Trustee and active champion of conservation, moved from Honorary Vice-chairman to Honorary Chairman.

Three new Trustees were welcomed to the Board, which was increased from thirty-six to thirty-nine members. Willard C. Butcher is Chairman of Chase Manhattan Bank and has a particular interest in corporate participation in the Society's work. Mrs. Charles A. Dana, Jr., and Mrs. Joseph A. Thomas have been exceptionally active friends of the Society as members of the Board of Advisors and the Women's Committee.

It has been a year of intensive planning in all divisions of the Society, with staff at every level forging ideas, practical and philosophical, that will transform the Society into a new kind of institution. General Director William Conway reports below on the nature of that effort, but it should also be noted, with gratitude, that he is leading the way with a vision that has never been bounded by fences.

Howard Phipps, Jr.
President

Groundbreaking for the Aquarium's Discovery Cove on March 21, 1986, was accomplished with the help of some Rube Goldbergian technology.

Report of the General Director

The Krakatoa phenomenon

In 1883, Krakatoa, the great Indonesian volcano, erupted in a series of tremendous explosions. The upheaval threw so much dust and debris into the air that global climates were affected, and the resulting tsunami (tidal wave) killed 36,000 people. At first, the rich jungles on adjacent parts of Java and nearby islands were completely denuded of life, their plants and animals extirpated. Now, these areas are forested again, filled with wildlife, not as richly as before but once again alive with birds and flowers and even a few rhinos and pythons. Plants and animals recolonized the site on their own; a testimony to life's resilience—as long as its seeds survive somewhere.

The New York Zoological Society is intensely involved in the struggle to assure that the seeds of life survive in as many forms and places as possible around the world, despite the destructive forces of human expansion. Toward that goal, the Krakatoa phenomenon offers a particularly instructive perspective on loss, change, and future opportunity. It provides an analog for the evolutionary relationship between human society and the natural world, and for the hope kindled by the emergence of new scientific understandings and perceptions of public service.

A new kind of institution

During the past year, the Zoological Society's staff has been engaged in re-examining and redefining the nature and significance of its work in the contemporary world. Out of this ongoing discussion has come an agenda of newly perceived responsibilities, and a realization of the critical need and unrealized opportunity for zoological gardens to expand their services to nature and society. The underlying concept can be set forth as follows:

1. The continuing increase in human numbers and land use is resulting in an unparalleled loss of life's biological diversity. Despite the immensity of the problem, some ecosystems and species can be saved, retained, or restored. In some places, social and economic Krakatoas will eventually cool, and the turbulence of their destructive tsunamis recede. But there is little public appreciation of the issues.

2. Zoos, historically seen as educational and recreational institutions, are becoming man's primary contact with living biological diversity. Located in most of the world's population and decision-making centers, they are financially supported, in large measure, by municipal funds. Unlike other kinds of

A lone Magellanic penguin in the surf at Punta Tombo, Argentina, one of WCI's principal project sites.

Teachers in Belize learned to use the WIZE curriculum guided by NYZS Zoo Education staff, including Manager of Programs Ann Robinson (left).

conservation societies, funds, and federations, zoos are based on conspicuous physical assets, namely live animals. They support the real thing, not some representation of it. At zoos, city dwellers can relate directly to the survival of nature.

3. With modest new investment and existing operating support, zoos are uniquely positioned to act as a new kind of institution on behalf of society, to provide centers for ecological education, scientific research, and species preservation in the battle to save as much of biological diversity as possible—if they are shown how.

The New York Zoological Society is evolving into this new kind of institution. With its city-based living collections, growing education programs, endangered species propagation and research efforts, and unique zoo-related field science and conservation projects, it is piloting a multifaceted, long-range conservation-education-action effort to preserve the diversity of life around the world. It is showing how.

Pioneering education

In both content and scope, the Society's pioneering program of zoo education has changed dramatically in recent years. With the publication of the first module of *Wildlife Inquiry Through Zoo Education* in 1984, the Zoo Education Department introduced, for the first time, a zoo-based wildlife curriculum for a nationwide school audience. In the past year an experimental use of WIZE was initiated in Belize to determine whether it could be adapted for teaching conservation in third-world countries (see page 26). Eventually, it is hoped that WIZE will reach an even broader audience around the world.

But zoo education need not be only a product of formal learning. It is also an intrinsic part of every new wildlife exhibition created by the Society. Discovery Cove, now under construction at the Aquarium, will demonstrate this with compelling participatory, habitat, and audio-visual exhibits. JungleWorld is full of information, but it is the beauty of the great forest habitats that affects visitors' reactions again and again. This affective lesson may have more long-lasting results than the cognitive messages we teach. Certainly, it has aroused great public enthusiasm and, especially, concern about the future of tropical forests and wildlife.

Pioneering conservation

What educators and exhibitions teach about wildlife preservation, field scientists study and act upon. The Society's Wildlife Conservation International strengthened its ability to study and act during the past year by adding four full-time research zoologists stationed in Asia, South America, and Africa (see page 41). WCI's staff of field conservation biologists is the largest of any international wildlife conservation organization, and the new appointees will help to coordinate programs in several key areas.

WCI Director George Schaller has said, "... WCI ought to look where others are working and then go elsewhere." Pioneering conservation in areas too remote, too difficult, too complicated, too little understood, WCI scientists are pushing toward a frontier of enlightenment about the status and needs of wildlife from Tibet to Patagonia, from the great tropical forests of Africa to those of South America and Borneo. Forest elephants and mountain gorillas, proboscis monkeys and okapis, Magellanic penguins, Patagonian sea lions, gibbons, hornbills, turtles, bats, and birds of paradise, as well as the environments and people with which they are inextricably interrelated, are all beneficiaries. Working with and training local people, planning parks, reserves, watersheds, and habitat restorations, helping to guide rational land and resource use, WCI scientists are providing a foundation for conservation programs that accomplish ecological preservation in tandem with economic development.

Breeding and reintroducing endangered species

At the Bronx Zoo, the Aquarium, and the Wildlife Survival Center on St. Catherines Island, some 1,700 offspring, many of endangered species, were born or hatched in 1985. Included were Guam rails and Guam kingfishers, species which, just before becoming extinct on their native island, were remanded to the Bronx Zoo, National Zoological Park, and Philadelphia Zoo for breeding. Again the Krakatoa phenomenon, for some extinctions are the result of transient pressures (in this case an introduced predatory tree snake), not permanent habitat destruction.

Human land-use and cultural practices will continue to change. While it is clear that many wild species will be lost and many ecosystems degraded, history suggests that some now "occupied" land will be released from intensive use. For the new science of ecological restoration, this is opportunity. It should be possible to reintroduce many species, if they still exist and if we know how.

Restoration know-how is the objective of a new program underway at the Wildlife Survival Center on St. Catherines Island. A small flock of hand-raised sandhill cranes are now flying free on the island, where the species had been extinct for many years.

Extinct on their native island, Guam kingfishers are being successfully bred and hand-reared at the Bronx Zoo.

Students apply field observation techniques in classes at JungleWorld.

Their progress is being carefully monitored. In addition, a Bronx Zoo-bred troop of Madagascar ring-tailed lemurs, at liberty for one year, has now produced young that are being raised uneventfully under the careful scrutiny of collaborating primatologists (see page 21). Seeds must be planted as well as sustained.

Bricks and mortar

Encouraged by strong City and private support, renewal is in progress at the New York Aquarium, Bronx Zoo, and Central Park Zoo. Groundbreaking in March for Discovery Cove signaled the largest expansion of the Aquarium's facilities since it opened on Coney Island in 1957. And, at last, renovation of the great Astor Court, renamed for Mrs. Vincent Astor in tribute to her major role in the Zoo's renaissance, has begun with the reconstruction of the palatial Elephant House. Closed to the public for nine years, this classical Beaux-arts structure will again become a home for elephants and rhinos, but its location at the heart of the Zoo will also make it "Zoo Center." In the Holarctic Zone of the Zoo, finishing touches were being put on the Himalayan Highlands, a Central Asian habitat exhibit for snow leopards, tragopans, cranes, and red pandas, scheduled to open in September 1986. And most of the building was completed at the redesigned Central Park Zoo. Director of the City Zoos Project Richard Lattis and his staff moved to temporary offices there late in the year.

The Society's longstanding partnership with the City and its representatives has continued to be exceptionally helpful to reconstruction as well as daily operations. This historical relationship, today involving the Department of Cultural Affairs, the Office of Management and Budget, the Department of Parks and Recreation, the offices of Bronx and Brooklyn Borough Presidents, and other agencies, has a particular relevance and importance to the kind of urban-based international organization the Society is becoming.

Planning

Increased conservation responsibilities give the Zoological Society special qualifications as an operator of cultural institutions in New York City. Through the very activity of preserving nature, its fauna and flora, the Zoo and Aquarium provide respite and improve the quality of life for millions of city dwellers (when the City Zoos are added, yearly attendance at Society facilities will increase to more than 5,000,000). Conservation is the underlying goal of the Society's education program, which strives to intensify the public's role in the protection of biological diversity, and it is the keystone of the Society's leadership among zoological societies. But there is much that needs doing.

Zoos and aquariums can be natural sites for the development of conservation expertise and for temporarily housing animals that are losing their homes in nature—but not as we know these institutions today. They are neither properly staffed nor adequately equipped. They are capable of caring only for a painfully small representation of diversity; staffed to provide guidance in but a tiny fraction of forseeable problems or educational needs. Despite its leadership, the Zoological Society is not exempt from this assessment. Hence the staff, individually and collectively, is involved in a major planning effort.

This planning process ranges from trying to find ways to better convey environmental information to how to feed a proboscis monkey, or a visiting group of schoolchildren. It is concerned with new sources of support; with the endocrinology of gorillas and the imaginative re-use of old buildings; with using studies of animals in the wild and in captivity to advance the burgeoning science of conservation biology. It is profoundly concerned with public service, and with the idea that zoos and aquariums, perhaps more than any other human institutions, reflect the status of the earth's biological health.

William Conway
General Director

Gorilla youngsters Tumai and Tunko made their public debut at the Bronx Zoo on August 15, 1985, in the company of Louisa Gillepsie and Caroline Atkinson.

NO PARKING

New York Zoological Park

Mammalogy

Evolution in the jungle

In its first year JungleWorld has proved to be a dynamic, ever-changing, living environment. The flora and fauna have fully acclimated to their new home and have also begun to grow and reproduce. As in nature, growth and reproduction are indications of success.

Among the mammals that inhabit JungleWorld, the greatest reproductive success thus far has been achieved by the troop of silvered leaf monkeys. Five growing youngsters, born in the exhibit since November, clamber over the buttress-root trees, tangled lianas, and rocky ledges of the Lowland Evergreen Rain Forest. This population increase is especially gratifying because, of all the mammals living in JungleWorld, only the silvered leaf monkeys were brought from the wild. Establishing the troop required two grueling trips to Indonesia by General Curator James Doherty and nearly twelve months of careful monitoring by the Mammalogy and Animal Health staffs. The five baby monkeys represent the culmination of these human efforts—and the beginnings of a viable program for the only breeding captive group of this species in the United States.

Living in the Bornean Mangrove Forest is a pair of small-clawed otters acquired from the Rotterdam Zoo and the National Zoo in Washington, D.C. Of the fifteen species of otters distributed worldwide, the Asian small-clawed otter is both the smallest and one of the most endangered. It is one of thirty-five endangered animals that the American Association of Zoological Parks and Aquariums has designated with Species Survival Plan (SSP) status. As participants in the SSP effort to breed these rare mammals, the Mammalogy Department staff were elated at the birth of four female otter pups on December 13. Throughout the spring, many Bronx Zoo visitors enjoyed the playful antics of the youngsters. Most important, however, will be the pups' future contributions to the survival of the species.

Other JungleWorld residents that have adjusted especially well to their new surroundings include proboscis monkeys, white-cheeked gibbons, Malayan tapirs, mouse deer, and slow lorises. Several of the proboscis monkeys, which are unusual both for their pendulous noses and their swimming ability, finally began to swim occasionally in their mangrove lagoon. The white-cheeked gibbons now travel arm-over-arm through the lianas of the Lower Montane Rain Forest, sometimes at amazing speeds and always with utmost grace. The pair of rare Malayan tapirs seem particularly relaxed lying along the riverbank beneath the white-cheeked gibbons' arboreal hilltop. A pair of slow lorises and a pair of mouse deer are on a "reverse light schedule," enabling JungleWorld visitors to observe these normally nocturnal mammals during daytime hours.

Ella and Alisa

On December 11, 1984, Indian rhinos Mayang Kumari (Pinkie) and Heiner were observed breeding during a twenty-four-hour watch by Senior Keepers Robert Terracuso and Patrick Thomas. For more than three years the staff had made many attempts to bring together these rather solitary animals, or others in the group, at the optimal time for mating. As a result of this breeding, and after a gestation period of 484 days, Ella (named for the late NYZS Vice-president Ella Foshay) was born on April 9, 1986. The first rhinoceros born at the Bronx Zoo, Ella is one of only twenty-nine Indian rhinos currently living in Northern American zoos. Unfortunately, in India and Nepal where there were once hundreds of thousands of free-ranging Indian rhinos, today only 1,800 survive; thus, the importance of maintaining a self-sustaining breeding group in captivity. Ella weighed a delicate 107 pounds at birth, but will continue to grow until she reaches her adult weight of 4,500 pounds in about eight years.

Rocky and his mother Adrienne have delighted large crowds at the Sea Lion Pool since his birth on June 5, 1986.

The long-term renovation of Astor got underway with work on the Elephant House (top).

Silvered leaf langurs produced five bright apricot-colored babies in their new JungleWorld forest home.

On August 23, 1983, with the assistance of the United States Fish and Wildlife Service and as part of a cooperative exchange program between the U.S. and the U.S.S.R., the Bronx Zoo received a female Siberian tiger, Alisa, in hopes of increasing the genetic diversity of the species in American zoos. On April 22, 1986, Alisa gave birth to two male cubs. By introducing a new bloodline, these two tigers should contribute significantly to the survival of the species in the United States.

Staff activities

General Curator and Curator of Mammals James Doherty continued to participate, along with Wyoming and Federal wildlife biologists, in a program that is attempting to save the black-footed ferret from extinction through captive breeding. Six animals were alive in captivity, and their status in nature is unknown. Mr. Doherty, aided by Assistant Curator Fred Koontz and Registrar Dan Wharton, also organized a highly successful internationally attended conference at the Wildlife Survival Center on St. Catherines Island, Georgia, on the status of lemurs in nature and in captivity.

In September 1985, Dr. Koontz was promoted to Assistant Curator of Mammalogy; he joined the Mammal Department staff in June 1984 as a Curatorial Trainee.

In October 1985, Senior Keeper Patrick Thomas was promoted to Assistant Superintendent. Employed by the Society since 1979, he served first as menagerie keeper and then as Wild Asia Senior Keeper.

In April 1986, Drs. Michael Hutchins and Cliff Rice joined the staff as curatorial interns. Dr. Hutchins recently completed his PhD in animal behavior at the University of Washington, after spending four years studying the behavior and ecology of mountain goats in Olympic National Park, Washington. Dr. Rice, previously a Research Fellow with WCI, was awarded his PhD by Texas A&M University for his field study of the behavior and ecology of Nilgiri tahr in India.

Mammal Census, Bronx Zoo (as of December 31, 1985)

Orders	Families	Species and subspecies	Specimens in Zoo	Specimens owned
Marsupialia—Kangaroos, phalanger, etc.	3	4	90	99
Insectivora—Shrews, hedgehogs	2	2	11	11
Chiroptera—Bats	4	9	842±	843±
Primates—Apes, monkeys, marmosets, etc.	6	24	182	187
Edentata—Armadillos, sloths, anteaters	2	2	1	1
Rodentia—Squirrels, mice, porcupines, etc.	11	24	215	213
Carnivora—Bears, raccoons, cats, dogs, etc.	6	28	108	89
Pinnipedia—Seals, sea lions, etc.	2	2	6	6
Proboscidae—Elephants	1	2	6	7
Perissodactyla—Horses, rhinoceroses, etc.	3	6	49	49
Artiodactyla—Cattle, sheep, antelope, etc.	8	34	622	652
Totals	**48**	**137**	**2,132±**	**2,157±**

N.B. Specimens in Zoo include 49 on loan to the NYZS from other collections. Specimens owned include 78 on loan to other collections from the NYZS. There were 69 species listed as protected in some degree. Births totaled 1,130±.

The Bird Bill

From its inception, the New York Zoological Society has been an active proponent of wildlife legislation, including early laws to prohibit the wholesale slaughter of gamebirds and to prevent the importation of birds for use by the millinery trade. The latest expression of that tradition is Curator Donald Bruning's involvement in formulating New York State legislation to restrict the importation of wild-caught birds. After two years of preparation, the bill was passed in August 1984 and implemented in November 1985. Dr. Bruning's efforts helped to defeat a well-financed attempt to distort the intent of the new law and render it ineffective.

As it now stands, the law does not affect the great majority of birds sold as pets in New York State—canaries, budgies, cockatiels, and other captive-bred species. The importation of large parrots and other exotics, however, will be permitted only for captive breeding by authorized zoos and aviculturists. The collection of these birds, many of which die before reaching the marketplace, has been extremely damaging to the wild populations of many species. New York's law, the first of its kind, has already set an example for action by other states and by the Federal government.

JungleWorld, a year later

The development and refinement of JungleWorld's avian collection continued throughout the exhibition's successful first year. New acquisitions from zoos in Jakarta, Singapore, and the United States increased the free-flying bird population to 110 individuals of 29 species, including Bali mynahs, laughing thrushes, Pekin robins, Indian shamas, Dhyal thrushes, and red-whiskered bulbuls in the Scrub Forest and Mangrove Forest; and hornbills, fire-tufted barbets, red-billed blue magpies, and green jungle fowl in the Evergreen and Lower Montane Rain Forests. Among other species, Javan tree ducks have been added to the silvered leaf monkey's habitat and black-winged stilts to the Indian gharial's river environment. Valuable lessons for exhibition planning have thus been gained about the compatibility of different animal species, orders, and even classes.

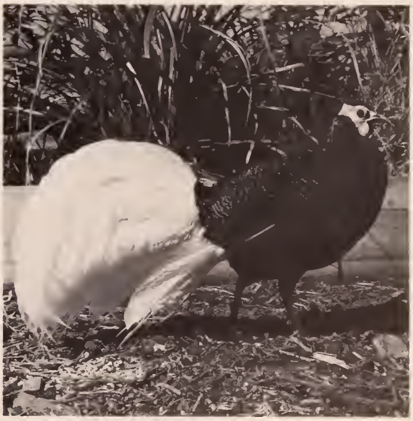
Propagation and acquisition

Guam rails and Guam kingfishers, saved from total extinction in 1984, have since produced, respectively, fourteen and nine chicks at the Zoo as part of a cooperative program with the National Zoo's facility at Front Royal, Virginia, and the Philadelphia Zoo. Rail breeding has been so successful that six offspring have been sent to the San Diego Zoo, two to the Pittsburgh Conservatory Aviary, and two back to Guam for the purpose of establishing additional breeding groups.

Also established at the World of Birds was the first sustained breeding program for the Bulwer's wattled pheasant from Borneo, known only since the 1930s and now listed as vulnerable in the *IUCN Red Data Book*. Twelve chicks were successfully reared during the year.

Notable acquisitions included a pair of helmeted curassows from Dr. J. Estudillo Lopez of Mexico City, two pairs of spectacular pheasant pigeons from New Guinea, a Blyth's hornbill, and a black and white crested hornbill. The curassows are part of a developing NYZS program for the chicken-like birds of the cracid family, which involves several species being

This Bulwer's pheasant chick, one of twelve raised at the Zoo last year . . .



will become rather more ornate as an adult. The species is endangered in its native Borneo.

bred at the Wildlife Survival Center and field research being conducted by Wildlife Conservation International in Venezuela.

Staff activities

In July, Dr. Bruning led an NYZS tour to Papua New Guinea and met with officials there to help establish the Crater Mountain Wildlife Management Area and the Conservation Foundation of Papua New Guinea. The Foundation oversees the tourist lodge at Ubaigubi and plans to initiate additional wildlife reserves in the country.

Dr. Bruning continued as chairman of AAZPA's Wildlife Conservation and Management Committee and as its representative to the Convention on Trade in Endangered Species (CITES). He was also made chairman of the Parrot Specialist Group of the International Council for Bird Protection (ICBP) after serving many years as its secretary.

Associate Curator Dr. Christine Sheppard was active in WCI's Magellanic penguin conservation project in Patagonia, where she led an NYZS members' tour in February that helped to band 4,000 birds.

Bird Census, Bronx Zoo (as of December 31, 1985)

Orders	Families	Species and subspecies	Specimens in Zoo	Specimens owned
Struthioniformes—Ostriches	1	1	4	4
Rheiformes—Rheas	1	1	8	8
Casuariiformes—Cassowaries, emu	2	2	5	4
Tinamiformes—Tinamous	2	2	8	8
Sphenisciformes—Penguins	1	1	10	6
Pelicaniformes—Pelicans, cormorants	2	4	13	13
Ciconiiformes—Herons, storks, flamingos, etc.	5	16	123	132
Anseriformes—Swans, ducks, geese, screamers	2	49	196	197
Falconiformes—Vultures, hawks, eagles	3	5	18	17
Galliformes—Quail, pheasant, etc.	2	25	90	91
Gruiformes—Hemipodes, cranes, rails, etc.	6	25	110	126
Charadriiformes—Plovers, gulls, etc.	8	24	107	107
Columbiformes—Pigeons, doves	1	10	33	22
Psittaciformes—Parrots, etc.	3	31	82	87
Cuculiformes—Touracos	1	6	23	26
Strigiformes—Owls	2	9	12	13
Caprimulgiformes—Frogmouths	1	1	8	11
Apodiformes—Hummingbirds	1	2	8	8
Trogoniformes—Quetzals	1	1	1	1
Coraciiformes—Kingfishers, hornbills, etc.	6	14	40	38
Piciformes—Barbets, toucans, woodpeckers	2	8	20	21
Passeriformes—Perching birds	25	127	295	293
Totals	**78**	**364**	**1,214**	**1,249**

N.B. Specimens in Zoo include 59 on loan to the NYZS from other collections. Specimens owned include 72 on loan to other collections from the NYZS. There were 96 species listed as protected in some degree. Hatchings totaled 272.

Herpetology

Focus on Asia

Coexisting with mammals, birds, fish, and invertebrates, more reptiles and amphibians—80 animals of 22 species—inhabit JungleWorld than any other Bronx Zoo facility except the Reptile House. During the year, a myriad of adjustments were made in JungleWorld's habitat and gallery exhibits to ensure that they simulate Asian forest environments as closely as possible. Special hot-and-cold-water mixing valves, air-conditioning units for various areas, water-cooling apparatus, lighting fixtures, subterranean heat pads, and aerator systems were added, or modified, to achieve desired temperature and humidity levels. Specific conditions were created for mugger crocodiles and giant monitors in the Scrub Forest, for Indian gharials and batagur turtles in the Lower Montane Rain Forest, and for the many small creatures in the Unseen Multitude Gallery.

The animals have responded well. The eight Indian gharials have each grown two feet in length and doubled in weight since their arrival in February 1985. The batagurs have also grown prodigiously. Already, there have been additions to the JungleWorld collection, including Asian water dragons, Vietnam box turtles, and a variety of bizarre amphibians and invertebrates.

At the Reptile House, new displays also featured Asian wildlife, including a pair of banded king cobras, tentacled snakes, and Chinese crocodile lizards. Philippine sailfin lizards were added to the Rain Forest exhibit, and baby Asian red-tailed rat snakes, parachute and Tokay geckos, Travancore tortoises, and Malayan false gharials were on view in the Nursery.

New arrivals, births, and hatchlings

Two female Coahuilan box turtles, received from the Dallas Zoo as hatchlings in 1981, were paired with a wild-caught adult male in December 1985. Both females laid multiple clutches, yielding fifteen young through June 1986. This vanishing species is known only in the marshes of the intermontane basin of Cuatro Cienegas, Mexico, where its survival may be threatened by construction activities.

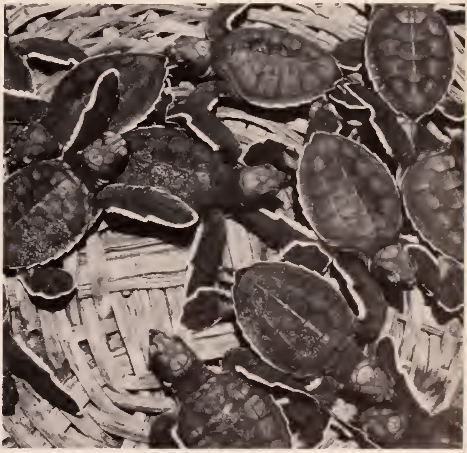
The Zoo's impressive record in crocodilian breeding continued. Eight Malayan false gharials hatched at the Reptile House, and five in a cooperative program with Metrozoo-Miami. Fifteen Chinese alligators hatched at the Rockefeller Wildlife Refuge in Louisiana, and two clutches of Cuban crocodile eggs yielded eighteen more Bronx Zoo babies. These accomplishments were acknowledged by a Significant Achievement Award from the American Association of Zoological Parks and Aquariums in 1985.

Important snake births included thirteen Kenya sand boas, eight Mexican rosy boas, eighteen Brazilian rainbow boas, ten Arizona mountain kingsnakes, and five Madagascan ground boas. Six Yucatan rattlesnakes were received from the Dallas and Ft. Worth zoos, five radiated tortoises from the Zurich Zoo, ten broad-snouted caimans from Japan's Atagawa Tropical and Alligator Garden, and four New Guinea snakeneck turtles from the Reptile Breeding Foundation, Picton, Ontario.

Staff activities

Keepers Bill Holmstrom, Kathy Gerety, and Joe Martinez, and Wildlife Survival Center Curators John Iaderosa and Al Valenzuela each led turtle-tagging teams to Tortuguero, Costa Rica. There, in joint NYZS-Caribbean Conservation Corporation operations, they participated in Dr. Archie Carr's thirty-year-old study of the nesting habits of the endangered green turtle. Some 2,212 turtles were catalogued during the summer 1985 season.

After twenty-seven years of service, Senior Keeper Bob Brandner left the department to become Co-director of Operations (with his wife Susan Basford, former Children's Zoo Operations Supervisor) of the Leatherback Turtle Research and Conservation Project, Sandy Point National Wildlife Refuge, St. Croix, U.S. Virgin Islands.



NYZS staff continued to assist in studies of the endangered green turtle to Tortuguero, Costa Rica. Some new hatchlings await transport to the sea.

Senior Keep Bruce Foster eventually persuaded JungleWorld's Indian gharials to make an appearance for PBS Television's *Nature* series.

Senior Keeper Holmstrom was appointed Malagasy radiated tortoise studbook keeper. He has computerized data on 204 specimens from 23 collections.

On behalf of the Society, Superintendent Peter Brazaitis continues to serve the U.S. Fish and Wildlife Service by identifying large numbers of imported endangered reptile products. His investigations concern the gross morphology and molecular "fingerprinting" of crocodilian skins and the application of modern forensic technology to international wildlife law enforcement. In October 1985, Brazaitis traveled to the Pantanal region of the Mato Grosso to assist the Brazilian government in developing management programs for the heavily poached Yacare caiman.

Curator John Behler concluded a two-year radiotelemetry project on the bog turtle at Bog Brook Unique Area in Putnam County. Funded by the New York State Department of Environmental Conservation, the study determined seasonal movements, egg-laying sites, and hibernacula fidelity. As coordinator of the Nixon Griffis Fund for Zoological Research, Mr. Behler oversaw the review of proposals and progress as it was reported in funded projects. Twenty-three projects from sixteen institutions were approved from among the July 1985 and January 1986 submissions. The curator was appointed chairman of the NYZS Research Committee and to membership on the IUCN/SSC Freshwater Turtle Specialist Group and the AAZPA Honors and Awards Committee. He also serves on the board of directors and the conservation committee of the Society for the Study of Amphibians and Reptiles.

Reptile and Amphibian Census, Bronx Zoo (as of December 31, 1985)

Amphibia orders	**Families**	**Species and subspecies**	**Specimens in Zoo**	**Specimens owned**
Caudata—Salamanders	2	4	13	13
Salientia—Frogs, toads	8	21	82	76
Totals	**10**	**25**	**95**	**89**
Reptilia orders				
Testudinata—Turtles	8	45	202	212
Crocodylia—Alligators, caimans, crocodiles	2	14	108	95
Squamata (Sauria)—Lizards	8	21	89	88
Squamata (Serpentes)—Snakes	6	78	265	243
Totals	**24**	**158**	**664**	**679**

N.B. Specimens in Zoo include 58 on loan to the NYZS from other collections. Specimens owned include 77 on loan to other collections from the NYZS. There were 57 species listed as protected in some degree. Births and hatchings totaled 133.

Return to the wild

In recent years, wildlife release programs have become important adjuncts to the Center's basic interest in captive breeding. Significant results were achieved during this past year in projects involving the reintroduction of three different species to the wild for the purpose of promoting their preservation and studying their environmental needs.

Southeastern sandhill cranes are now reduced to four populations in Florida and southern Georgia. For three years, the WSC staff has been incubating eggs collected by the Florida Department of Fish and Game at Osceola National Wildlife Refuge, hand-rearing the chicks, and releasing them in a wet meadow at the center of St. Catherines Island. Seven young cranes released last year bring the three-year total to twenty-one. Natural foraging is regularly observed and the older birds have pair-bonded, which may lead to breeding and nesting as early as 1987.

Six orphaned American wood storks, hand-reared at the Center, were returned to their parental flock at the Savannah River Nuclear Plant. Only five of the young birds joined the flock. The sixth was feared lost to predators until it was located with a flock in North Carolina.

The third project, involving ring-tailed lemurs raised at the Bronx Zoo and released at St. Catherines in June 1985, is devoted to learning more about the animals themselves and creating a model for eventual releases in their native Malagasy Republic. Maneuvering through their grape-arbor environment with increasing confidence, the lemurs quickly shed excess weight and stabilized at 2.9 kg., the average weight for their species in the wild. One of the four females is successfully rearing twins that she gave birth to in the spring.

The lemurs' behavior and adaptation are being monitored by biologists and students under Dr. Timothy Keith Lucas of the University of the South. In addition, field and zoo scientists from around the world gathered on April 26 and 27 at St. Catherines to consider what steps might be taken to protect all Madagascan prosimians and their habitats. The resulting plan to ensure the survival of lemurs and other forms of life endemic to Madagascar was well received by Malagasy officials, who are scheduled to be represented at a second conference.

Mammal management

Lemurs were also prominent in captive breeding, with seven births among four species. The program established last year for the endangered Nile lechwe, a shy, swamp-swelling antelope of the Sudan, produced three calves. Five calves were born to the herd of Arabian oryx, which was extinct in the wild by 1972 but has been successfully reintroduced in Oman after years of captive breeding in the United States.

The Center's gemsbok herd, the first to be established on St. Catherines in 1974, was finally dispersed to other institutions in the spring. They served as an invaluable trial species for the closely related but more endangered antelope species that followed.

Ring-tailed lemurs, observed here by NYZS Advisor Robert Wood Johnson IV, have flourished in an experimental release program at the Wildlife Survival Center in Georgia.

Cracids, cranes, and cockatoos

Several new species have been added to the bird collection, including black-neck screamers, brush turkeys, and two members of the cracid family—yellow-nobbed and bare-eyed curassows. The turkey-like curassows are part of a larger program, involving the Center, the Bronx Zoo, WCI field researchers in Venezuela, and Dr. Jesus Estudillo of Mexico City, devoted to captive breeding and accumulating information about the little studied cracids before their habitat is destroyed by agricultural and industrial development.

White-naped crane and palm cockatoo chicks hatched for the first time at the Center, giving hope for future breeding of these cooperatively managed species. Some important hatches, now considered common at the Center, included two Pesquet's parrots, seventeen red-fronted macaws, and twenty-two cranes of four species.

Tortoise totals

The refinement of management techniques and diets for tortoises have had an encouraging effect. A record twenty-two radiated tortoises were hatched, with thirteen going to other institutions. Eggs were also collected from the giant Aldabra tortoise and from the group of four yellow-footed tortoises donated by the Paramaribo Zoo in Surinam.

Staff activities

Wendy Turner, formerly of the Los Angeles, Woodland Park, and Honolulu zoos, joined the staff as Aviculturist. Steve Balzano, an ornithology keeper at the Bronx Zoo for several years, was hired as zoological technician and will work with mammals and reptiles as well as birds.

Two interns were selected for the Center's annual summer program. Brad Winn, a graduate of the University of Vermont, was curator of the Wyoming Waterfowl Trust and banded birds in the rain forests of Brazil for the World Wildlife Fund. Jeff Spratt, a biology graduate from Hiram College, will enter Tulane University for post-graduate work in parasitology.

James Murtaugh, Associate Curator at the Center since 1982, was named Curator of the Central Park Zoo. John Iaderosa, formerly Zoologist, became Assistant Curator and assumed reponsibilities for administration and management of the collection.

Wildlife Survival Center Census (as of December 31, 1985)

Mammalia orders	Families	Species and subspecies	Specimens in Zoo	Specimens owned
Marsupialia—Wallabies	1	1	11	11
Primates—Lemurs	1	6	24	11
Perissodactyla—Zebras	1	1	18	16
Artiodactyla—Antelope	1	8	90	80
Totals	**4**	**16**	**143**	**118**
Aves orders				
Anseriformes—Screamers, geese	2	2	2	2
Galliformes—Pheasants	2	5	19	15
Gruiformes—Cranes, bustards	2	7	42	56
Columbiformes—Pigeons	1	1	0	1
Psittaciformes—Parrots	2	7	21	27
Coraciiformes—Hornbills	1	4	23	16
Totals	**10**	**26**	**107**	**117**
Reptilia orders				
Testudinata—Tortoises	1	4	70	36

N.B. Specimens at Center include 83 on loan to the NYZS from other collections. Specimens owned included 38 on loan to other collections from the NYZS. There were 34 species listed as protected in some degree. Births and hatchings totaled 102.

Animal Health

A promise fulfilled

In just over a year of operation, the new Animal Health Center has more than fulfilled expectations. Large animals that once had to be treated on site can now be moved to the Center. Holding areas of sufficient size, cages with floor pools for waterfowl, a hands-off system of shutes and sliding doors, and many other innovative features have reduced stress on animals and staff alike, simplified handling methods, and broadened the possibilities of care. The result is a greater capacity for dealing with problems and a faster rate of recovery.

New types of equipment also play an important role. These include a fiber-optic flexible endoscope provided by the F.M. Kirby Foundation which allows visual inspection of the esophagus and stomach in animals as different as deer, dolphins, and tigers; ultrasound examinations of the heart, reproduction tracts, or digestive organs in gorillas and other large mammals; and electrocardiograms in tiny bats as well as full-grown elephants. A grant from the Gilman Paper Company made it possible to videotape many medical procedures, from immobilization to surgery. The resulting visual archive will serve not only the care of the Society's and other wildlife collections, but also as teaching tools in the Animal Health Center's training programs for veterinary students and veterinarians.

Recordkeeping

With the help of volunteers from Friends of the Zoo, more than 10,000 tissue specimens collected since 1972 were rebottled, labeled, and filled in the tissue library. Files for paraffin blocks of tissues, frozen serum, and plasma were also completed.

The medical records were reorganized into a more accessible system by Dr. Robert Cook, the new resident in clinical medicine, who used a computer program developed by Dr. Janet Stover to enter medical case records retroactive to January 1, 1986. Documented are previous procedures involving anesthesia, x-ray, and clinical pathology, for species and for individual animals. Data relating to microbiology, hematology, parasitology, clinical pathology, and general pathology will be entered into a similar computer program.

Nutrition research

The department's studies of Vitamin E metabolism in zoo animals have reached their most productive phase. After more than 1,000 tests, the exact dietary levels needed by many species are now known. Work has already begun on comparing Vitamin E levels in animals of various age groups and reproductive states to assess their effect on newborn viability and, ultimately, on longevity.

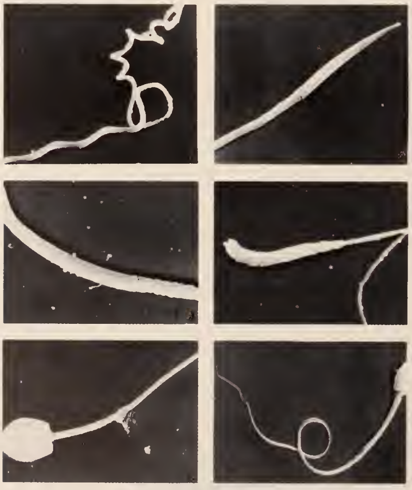
Dr. Emil Dolensek examines a monitor lizard, which was successfully treated for a mouth condition.

In order to continue exploring the critical role of Vitamin E and to open up new studies of other vitamins, minerals, and nutrient interrelationships, a full-time nutritionist has been added to the staff. Dr. Ellen Dierenfeld, who received her Ph.D. in animal nutrition from Cornell University, has worked in the field as well as the laboratory. She has already begun evaluations to determine optimum levels of vitamins A and D, particularly in birds and reptiles, and instituted a computer program to record the nutritional makeup of every diet used in the Zoo and Aquarium. An effort is also being made to collate information from WCI field zoologists about the eating habits of animals in the wild.

Reproduction Studies Unit

Significant progress was made in the areas of endocrinology and sperm morphology by Dr. Minu Chaudhuri and Dr. Cheryl Asa at the Population Council, the Society's partner in this work. Their studies involved several rare and endangered species.

While monitoring the estrous cycles of the Zoo's gorillas, Dr. Chaudhuri made a potentially very important discovery for captive breeding. The four non-fertile animals had one pattern in common—a very high level of estrogen in their early cycles, with no evidence of ovulation. Since it is known that high estrogen can inhibit the leutinizing hormone necessary for ovulation, one of the females was given an antiestrogen compound used for similar problems in women. The animal began to ovulate on the next cycle and appears to have continued to do so routinely. By improving the gorillas' reproduction record, this development may help to reverse dire long-term projections for the species in captivity. Meanwhile, other steps are being taken as part of a concerted effort on the gorilla's behalf, including the collection and examination of sperm by Dr. Stover at several zoos around the country, among them Buffalo and Kansas City in the past year.



Scanning electron micrographs of the spermatozoa of (clockwise from upper left) an Asian painted frog, a Texas rat snake, a crested tinamou, a white-naped crane, a degu, and a snow leopard.

Other endocrinology studies were devoted to male white-naped cranes at the Bronx Zoo and the single female giant panda at the National Zoo in Washington, D.C. It was observed that testosterone levels rose by a factor of 1,000 when cranes entered breeding condition in the spring. In the panda study, which began in 1983, conditions of normal estrus, induced estrus, pregnancy, and pseudopregnancy are being determined by measuring estrogen and progesterone levels in urinary steroids.

Dr. Asa completed ultrastructural analyses of sperm from eleven species of mammals, four of birds and reptiles, and two of amphibians. Establishing how normal organisms look will help to identify abnormal ones and to determine the effects, for instance, of freezing on the integrity of membranes. An interesting comparative sperm-surface protein analysis revealed that the horse's sperm is remarkably similar to man's, while the deer's and mouflon's are quite different.

To date, semen has been banked for twenty-nine species, and reproductive tract anatomy has been studied in 107 species. These include most of the hooved species in the Zoo's mammal collection.

Veterinary Residents Program

Generous support from Mrs. Shirley Katzenbach made possible the addition of two residents to the staff. Dr. Robert Cook, a V.M.D. from the University of Pennsylvania and former Veterinarian of the Cheyenne Mountain Zoo in Colorado, took up residency in clinical medicine. Dr. Tracey McNamara, a Cornell University graduate, became pathology resident in shared duties with the Animal Medical Center in New York. Both were in the six-week preceptorship program for senior veterinary students at the Bronx Zoo's old Animal Hospital.

Learning in the rain forest

With the opening of JungleLab in early November, a new concept in zoo education was introduced. Overlooking the rain forest habitats in JungleWorld, hidden from view at treetop level, this observation outpost is the first classroom to be incorporated within a Bronx Zoo exhibition. Partly modeled on William Beebe's field research station in Trinidad, JungleLab offers students the opportunity to observe and record the behavior and social interactions of various birds, Malayan tapirs, gibbons, and silvered leaf monkeys, aided by scientific equipment ranging from binoculars and telethermometers to calculators and tape recorders. *JungleLab Field Notes,* published with funds from Chase Manhattan Bank (which also funded JungleLab itself), help students to focus the entire JungleWorld experience.

The new teaching space is used daily for lectures, seminars, and courses at all audience and school levels. Special lectures were offered on "Primates of the Orient" by Dr. Mary Pearl, WCI's Administrator of Conservation Programs, and on the "Birth of a Jungle" by John Gwynne, NYZS Curator of Exhibition and Graphic Arts. "Project: Jungle Exploration," "Working with Wildlife," and "Dawn in the Jungle" were other sessions for adults and families designed to make use of the lab's special features.

General audience programs

Several new courses for adults underscored the work of zoos in species preservation. These included lectures by Associate Veterinarian Dr. Janet Stover on advances in reproduction biology and by WCI Associate Research Zoologist Dr. Charles Munn and Assistant Curator of Education Douglas Falk on efforts to save the parrots of South America. Other new titles were "Species Survival Plan," "Venom," "Masters of the Skies," "Focus on Animals," "Inside the Animal Mind," "Evolution of Behavior," and "High Society." Special perspectives were offered by Associate Curator of Ornithology Dr. Christine Sheppard ("Birds Do It") and Assistant Curator of Mammals Dr. Fred Koontz ("Insights from Behavioral Research").

Summer programs in 1985 were scheduled for all ages and included "Wingspan," a unique four-day camp for adults. Guided by experts in various aspects of avian life and lore, participants learned about the biology, behavior, and conservation of birds, and their place in art and literature. "Zoo Explorers" was introduced to provide a structured educational experience for visiting summer campers. Nearly 1,000 seven- to twelve-year-olds explored animal biology and adaptations in one-hour classroom sessions involving live animals and artifacts. Ten one-week sessions of "Zoo Camp" for ages eight to twelve, and two one-month

Field research equipment, such as this parabolic microphone wielded by Instructor Donald Lisowy, is used extensively in JungleWorld classes.

"Summer Internship" series for teens continued to provide the most intensive experience for young people interested in wildlife.

In the spring of 1986, the experimental "Family Discovery Center" was offered free of charge to general visitors on eleven successive Saturday afternoons. Nearly 1,000 adults and children attended these mini-lessons on such topics as "Sensorama," "Birds of a Feather," "Footprints," "Animal Vocalizations," and "Wildlife Conservation."

School programs

The first Bronx Zoo courses based on *Wildlife Inquiry Through Zoo Education (WIZE)* were initiated for junior high and high school students. The two modules of this innovative curriculum, conceived and written by members of the education staff, are used in "Diversity of Lifestyles" and "Survival Strategies," which deal with animals of the land, air, and water and with issues of wildlife conservation. Junior high students were also involved in "Researching Wildlife," a program funded by the New York State Council on the Arts. Some 350 talented underprivileged youngsters from the Bronx and Manhattan were exposed to field biology at the Zoo as part of an effort to stimulate their interest in applying to one of New York City's special high schools.

Several new initiatives were undertaken to encourage schools and school districts to use the Zoo and its educational resources as adjuncts to their own science curricula. In spring 1986, the department hosted a special event at the Zoo, sponsored by the Chase National Bank of Westchester, for representatives of twenty-two school districts in Westchester County. Also in the spring, workshops were conducted for 60 bilingual teachers and paraprofessionals, and all the science coordinators in New York City. A generous grant from the Geraldine R. Dodge Foundation made possible two five-day summer seminars for teachers at the Bronx Zoo, with accreditation provided by Fordham University's graduate division. Applications were received from teachers throughout the country.

Enrollment by organized school groups experienced a record increase of forty percent over the previous year. The general audience programs increased by fourteen percent. Total course attendance was 25,173; nearly 1,000 classes averaged 2.5 hours per session.

WIZE, at home and abroad

A year after publishing the first module of WIZE *(Diversity of Lifestyles)* in the United States, Canada, and Australia, Dale Seymour Publications contracted to publish the second module *(Survival Strategies)*. Already used by nearly 30,000 students nationwide, WIZE has had a growing impact on the teaching of zoology and wildlife conservation in this country.

WIZE itself received several prestigious awards from various sectors. The 1986 Award for Excellence in Education was presented by the American Association of Zoological Parks and Aquariums. The COSMOS Corporation, a Washington, D.C., based research firm under contract from the National Science Foundation, chose WIZE, out of 350 programs nominated, as one of the six most outstanding science programs in the United States. WIZE was also the New York State nominee in the National Science Teachers Association nationwide "Search for Excellence."

Supported by a National Science Foundation project dissemination grant, the Education Department staff conducted workshops on the methods and materials of WIZE at eleven professional conferences, including the National Association of Biology Teachers conference in Orlando, Florida; the New Jersey Science Teachers conference in Somerset; the regional National Science Teachers Association conferences in Hartford, New Orleans, and Kansas City, and the national conference in San Francisco. Papers were presented by department staff at both the regional and national conferences of the American Association

Belizean teachers learned to use the first module of WIZE in Belize and at the Bronx Zoo.

of Zoological Parks and Aquariums in Boston, Massachusetts, and Columbus, Ohio, respectively. Locally, extensive seminars were presented for the Science Council of New York and the New York Biology Teachers Association.

Cooperating with the Society's Wildlife Conservation International (WCI) division, the Education Department brought the WIZE program to schools in the Central American nation of Belize, where WCI field scientists have conducted several important field projects. With support from the Belize Ministry of Education and the U.S. Agency for International Development, the WIZE program will teach ecological awareness in a country that is attempting to work out a rational conservation plan. Forty teachers and principals trained by Education Department staff in Belize are now providing instruction and trips into wilderness areas for nearly 2,500 upper level students.

Friends of the Zoo

In addition to information and assistance they provided for more than 18,000 visitors, the 200 Friends of the Zoo spent some 6,000 volunteer summer hours working as interpreters in the Children's Zoo. They also led specialized tours of the various zoo buildings, answered the many letters submitted by children, assisted at special events, helped teach the "Windows on Wildlife" program, and conducted a visitor survey to ascertain the geographic distribution of our visitor population. Some of the volunteers have contributed beyond their normal workload by assisting in the new Animal Health Center, where they sorted and catalogued an enormous number of specimen slides, among other things. Others visited hospitals with animals as part of the "Outreach" program, which this year received an award from the New York State Recreation and Park Society in its therapeutic recreation category.

The Children's Zoo and animal rides

Since opening in 1981, the Children's Zoo has served as a model for other zoos around the world. Even in Singapore, a new zoo will feature a "prairie dog" exhibit and a "spider web." While the Children's Zoo is still attracting new and return visitors, with an attendance of more than 663,000 last year, the staff is preparing for the possible addition of new participatory graphics and exhibits for the locomotion and defenses areas. In the desert area, two fennec foxes were born, sired by Freddie, the Children's Zoo's most famous resident.

The first fennec foxes born at the Children's Zoo were hand-raised at the Animal Health Center.

In Wild Asia Plaza, a new ramp allowing two camels to be mounted at one time was installed in the spring of 1986. The camel rides, camel exhibit, and Wildlife Theater show on the Plaza Stage, along with scripts provided for the Bengali Express and Safari Tour trains, bring the Education Department into contact with almost every visitor to the Zoo.

Children's Zoo Census, Bronx Zoo (as of December 31, 1985)

Mammalia orders	**Families**	**Species and subspecies**	**Specimens in Zoo**	**Specimens owned**
Marsupialia—Opossum	1	1	1	1
Insectivora—Hedgehogs	1	1	2	2
Edentata—Armadillos	1	1	1	1
Lagomorpha—Rabbits	1	2	41	41
Rodentia—Mice, porcupines, etc.	5	7	22	22
Carnivora—Foxes, ferrets	4	5	15	15
Perissodactyla—Horses	1	2	4	2
Artiodactyla—Goats, sheep, camels, etc.	2	5	36	35
Totals	**16**	**24**	**122**	**119**
Aves orders				
Ciconiiformes—Herons	1	3	4	4
Pelicaniformes—Cormorants	1	1	1	1
Anseriformes—Ducks, geese	1	7	73	73
Falconiformes—Falcons	1	1	4	4
Galliformes—Chickens	1	3	36	36
Strigiformes—Owls	2	3	6	6
Caprimulgiformes—Frogmouths	1	1	1	1
Columbiformes—Doves	1	2	4	4
Psittaciformes—Parrots	2	6	6	3
Passeriformes—Perching birds	1	1	1	1
Totals	**12**	**28**	**136**	**133**
Amphibia orders				
Caudata—Salamanders	2	2	2	2
Salientia—Frogs, toads	3	3	16	16
Totals	**5**	**5**	**18**	**18**
Reptilia orders				
Testudinata—Turtles	3	8	35	35
Crocodylia—Alligators	1	1	3	3
Squamata (Sauria)—Lizards	2	3	6	6
Squamata (Serpentes)—Snakes	2	8	16	16
Totals	**8**	**20**	**60**	**60**

N.B. Specimens in Zoo include 6 on loan to the NYZS from other collections. There were 21 species listed as protected in some degree. Births and hatchings totaled 7.

Exhibition and Graphic Arts

Himalayan Highlands

Work that had been suspended on a major exhibition in the Holarctic area of the Zoo was resumed and nearly completed. Created by an in-house team of designers, rock sculptors, horticulturists, and graphic artists, the high-altitude forest for the Zoo's famous breeding group of snow leopards and other Himalayan species was scheduled for official opening in September 1986.

Occupying a hillside near the polar bear habitat, the complex has three separate but connected areas for snow leopards, with behind-the-scenes shelter and breeding facilities. Tragopan pheasants, though protected, appear to be within the leopards' grasp. The meandering walkway ends with a wooded environment for red pandas, and across the main path is an observation blind hidden in a marsh for white-naped cranes, another endangered species that the Society has bred with great success. The visitor moves between massive boulders, through brakes of bamboo and cedar, and across a rushing stream spanned by a carefully replicated Nepalese suspension bridge. The landscape is filled with Asian plants and flowers, and wooden architectural elements merge with the rocks and berms. Participatory and interpretive graphics convey the snow leopards' plight in their diminishing habitat and describe efforts by the Society's WCI field scientists to preserve this great cat.

Employing new techniques and materials, artisans were called upon to reproduce eroded schists with quartz veining and mica-flocked surfaces. These were then "weather" stained or spotted with painted "lichens" of a kind found at Annapurna in Nepal. In some viewing areas, huge panels of glass were tilted to reduce reflections, and elsewhere a very fine stainless steel wire was used to enclose the exhibition while miimizing the visibility of barriers between animals and people.

Finishing touches at JungleWorld

During JungleWorld's immensely successful first year, several important improvements and adjustments were made, particularly in signage and planting. Color tabs were added to the handrail graphics to facilitate

At the Himalayan Highlands, sculptors worked to re-create the Central Asian habitat of snow leopards.

the identification of animals and plants in the exhibits. A new map of Asia emphasizing the building's conservation theme was installed in the entrance gallery. High-tech displays illustrating the maneuvers and strategies of mangrove animals were being prepared for the Mangrove Gallery and a dramatic presentation of giant rain-forest insects for the Unseen Multitude Gallery. Despite initial concerns, the highly experimental man-made trees, with their epoxy coatings, have not only withstood the constant use of animals, but have even been receptive to the growth of algae on their "barks."

Renewing the Elephant House

The long-term renovation and restoration of Astor Court, the Zoo's great Beaux-Arts mall, began with work on the palatial Elephant House during the late summer. Elephant and rhino exibits, interpretive galleries, and a Zoo information center were nearing completion inside the building. Bids were received on contracts for creating expansive, wooded outdoor habitats, and that phase of the project was due to begin in the early fall of 1986.

Back to Africa

Preliminary plans were completed, and City funds budgeted through the Department of Cultural Affairs, for a project that will begin to refocus and refurbish the Zoo's oldest geographic zone. African Plaza, modeled on the mud and thatch villages of West Africa, will serve as a visitor orientation and sales center, with food and gift facilities, changing cultural exhibitions, and a field lab and classroom, modeled on JungleLab, for special courses in savannah wildlife and ecology. The lab will overlook a spectacular new exhibition based on the rolling grasslands of Ethiopia's high plateau. Featured here will be geladas—large ground-dwelling monkeys known for their complex social behavior and now reduced to a single population in their native habitat—as well as ibex, hyrax, and ground hornbills.

Aquarium projects

The Aquarium's new full-time exhibition staff created some new exhibition tanks and refurbished others. In preparation for the construction of Discovery Cove, the innovative exhibition-education complex now underway at the Aquarium, the crew also built a series of prototypes for participatory exhibits in order to test their viability as teaching devices and their appeal to children and adults.

Graphic design and production

The completion of JungleLab, the first classroom to be built within a zoo exhibition, was accompanied by the creation of *JungleLab Field Notes.* Designed for the Education Department's special classes in JungleWorld, the kit emphasizes the field observation of wildlife behavior and social interaction and the intricate interdependence of animals and their environment.

Hundreds of new signs for the Zoo and Aquarium, as well as invitations, brochures, and T-shirts for the Education and Public Affairs departments were created by the design staff. They also published the first useful poster for identifying all the species and subspecies of Amazon parrots. Its primary purpose is to help customs officials prevent illegal importation of these popular and increasingly rare birds.

Horticulture

Because no zoo exibition has combined plants and animals in such variety and abundance before, JungleWorld required constant and careful monitoring during the year by the horticulture staff. Most of the hundreds of plant species flourished, with treetops reaching and spreading across the skylights, thunbergia vines scrambling up fifty feet in only four months, palms seeding themselves naturally on the forest floor, and certain plants, such as grasses, adapting to seasonal cycles.

Some adjustments have been made. While leaf-eating monkeys were expected to pose a challenge, it was not anticipated that the small-clawed otters would require quite so much plant material to make nests for their litter of pups. The voraciousness of the silvered leaf monkey, on the other hand, has so far been circumvented by the substitution of pandanus for plants that are more attractive to them.

Dozens of Asian mountain plant species were brought in for the Himalayan Highlands, beginning with the largest firs, which were hoisted into place by crane in March. These were followed by Himalayan birch, bamboos, deodar cedar, paperbark maple, buckthorn, eleagnus, magnolia, a dozen Nepalese rhododendron species, wild monkshood, ferns, cotoneasters, and three species of primula, which should do well along the exhibition's mountain stream. These species were supplemented by close analogs of authentic Asian plants that were either unavailable or unsuitable for the conditions.

The Zoo-wide computerized inventory of trees, completed with funding from the Norcross Wildlife Foundation, will provide a basis on which to maintain the Park's forest stock. Half the Zoo's 23,000 trees were revealed to be under some kind of stress and in need of remedial measures. The survey was also extended to include the Zoo's major indoor plantings.

Bronx Zoo exhibitions

After a year-long effort, the Himalayan Highlands exhibition for snow leopards and other Asian species neared completion. Outside contractors excavated and graded the site; poured concrete foundations and footings; constructed walkways, viewing pergolas, and animal shelter buildings; and stretched lightweight protective netting. The Society's Exhibition and Graphic Arts staff designed the exhibition; fashioned elements such as artificial rocks, fallen trees, and architectural carvings; created interpretive graphics; and installed the many species of Asian alpine plants.

Scaffolding surrounded the Elephant House cupola as restoration work began.

Renovation of the great Elephant House, funded jointly by the City and the Society, was contracted out and begun in late summer 1985. After gutting the interior, workmen completely replaced the building's electrical, plumbing, heating, and ventilating systems. New moated exhibits for elephants and rhinos, educational interpretive galleries, a Zoo information center, and other interior features were scheduled for completion in early 1987, while the extensive outdoor exhibit renovation was contracted and about to get underway. This project is the first step in the overall renewal of Astor Court.

Energy projects

Four of the five bid packages for the proposed Cogeneration and District Heating System, which would give the Zoo a more modern and efficient system of producing and distributing heat, hot water, and electricity, were received within the Society's and City's cost guidelines. The fifth package was due to be restructured and rebid. If and when the bidding process is successfully completed, the Society would be in a position to order the generators for the system, and the City-funded contractors would start excavating for the 15,000 feet of new piping and electrical wiring. The project would be scheduled for completion in two and-a-half years.

Under Energy Conservation Phase I, funded by the City, several heating plants at the Zoo were modernized with the latest fuel-saving features. Insulation and storm windows and doors with double glazing were added in the Monkey House, the World of Darkness, and the South American buildings. Phase IIa was bid by the City and work was scheduled to begin in September. Phase IIb was under design and would be ready for final review in the late fall.

Other improvements and acquisitions

The Society-sponsored renovation and repair of the South American animal management building, including new cages, doors, kitchen, and tile floor, was undertaken by the Zoo's construction work force. Outside contractors were used to repair maintenance storage sheds and the Cafeteria floor, to reroof Propagation I at the World of Birds, and to convert the old Beebe Lab for use by the Publications Department.

Smaller in-house projects involved relocating the queue line for the Skyfari, building a new double-loading platform for the camel rides in Wild Asia Plaza, and repairing and restoring the retaining wall around the old Bird House on Astor Court.

New York Aquarium

Exotic exhibits for growing crowds

Culminating a fifty-percent attendance rise in five years, the Aquarium welcomed 621,547 visitors in 1985-86. Complementing this growth were several new exhibits and educational programs, some significant births and hatchings, and the continued renewal of the Aquarium's physical plant.

Rare Australian desert gobies, collected by NYZS Trustee Nixon Griffis, were shown at the Aquarium for the first time. Their exhibit tank in the Main Hall was designed to replicate a shallow desert pool in an extremely harsh environment, where the temperatures can range from 50° to 104°F (9° to 40°C). Breeding of these sometimes iridescent fish has already occurred, and several spawns have been raised to adult size.

In the Cold-water Marine Gallery, a group of European cuttlefish, given by the Monterey Bay Aquarium, were also the first of their kind in New York. More closely related to squid than octopus, these active cephalopods occur along the coasts of Spain, Portugal, France, and the British Isles. They move by jetting water through funnels under their tentacles and by undulating their membranous fins. Masters of camouflage, they rapidly change colors, particularly at feeding time when they stalk live grass shrimp. The Aquarium raised twelve of these unusual creatures to maturity.

Another first was an exhibit of sea spiders collected off Montauk, Long Island, by Curator Dr. Erwin Ernst. These strange-looking creatures are also known as "no body" spiders because it appears that they are all legs and have no "bodies" or heads.

A ten-foot small-tooth sawfish and a shovelnose guitarfish were put on exhibit with the sharks and rays in the 90,000-gallon shark exhibit. Sawfish are distinctive in that they resemble both sharks and rays. Although they are more sharklike in appearance, they share a bottom-dwelling existence with rays. The guitarfish is similar in appearance and body shape to the sawfish, but it lacks the latter's long rostrum armed with teeth. A bottom-dweller, the guitarfish can occasionally be seen half buried in the sand like a stingray or flounder.

Most of the other new additions are species from western seas, including giant clams from the South Pacific; two-spot prawns, wolf eels, rockfish, giant octopus, and Alaskan king crabs from the Pacific Northwest; black-tip sharks and white-tip sharks from Hawaii; giant jawfish from Baja California; angel sharks, and giant sea stars from Southern California; pinecone fish and giant spider crabs from Japan; clown fish anemones, tube anemones, exotic sea cucumbers, and live coral from the South Pacific; and chambered nautilus from Palau and the Philippines.

Births and hatchings

Martha, an eight-year-old grey seal, gave birth to a 44-pound male pup named Chico on January 25. Born herself at the Aquarium on February 20, 1978, Martha had a stillborn in 1984 and is the mother of Emgee, a male pup born in 1985. Chico brings the Aquarium's grey seal population to six.

Interestingly, grey seals around the British Isles pup from September to November, while those in the western North Atlantic pup from early February into March. All three of Martha's pups, however, were born in January, on the 24th, 25th, and 28th.

Some other significant offspring this year included ten southern stingrays born in the shark tank, seven black-footed penguins, and numerous two-spot prawns spawned shortly after arrival from Vancouver.

One Aquarium class about animal locomotion features family kite-flying.

Nuka the walrus contemplates the world from her Aquarium pool.

Performing pinnipeds and porpoises

The Animal Training Department premiered a new presentation for the public this season: a three sea lion show. This trio consists of the mature, breeding-age male named Jaws and two mature females, Gigi and Seaweed, a combination that would challenge even the most experienced trainer. Head Trainer Alysoun Seacat and her staff produce not only regularly scheduled sea lion performances but also behavioral demonstrations with bottlenose dolphins and beluga whales.

A narrator has been added to the behavioral demonstrations and the public feeding sessions of seals, sharks, and penguins. Through these sessions, which end with a question-and-answer period, the Aquarium informs the public about the biology and physiology of these marine mammals, fish, and birds.

Rescue and rehabilitation

As a member of the Marine Mammal Stranding Network, the Aquarium assists in coordinated efforts to help stranded and debilitated marine animals regain their health and return to the wild. Several interesting cases occurred during the year.

A female longfin pilot whale, found stranded in Raritan Bay, New Jersey, was brought to the Aquarium emaciated and suffering from a viral infection. After examination, NYZS Chief Veterinarian Dr. Emil Dolensek prescribed antibiotics to be administered with feedings. But despite arduous efforts led by Aquarium staff, the whale unfortunately succumbed on the seventh day to the physical problems that led to her stranding initially.

A mother dwarf sperm whale and its baby found stranded at Virginia Beach were transported to the Virginia Institute of Marine Sciences. The mother whale died in transit, and the baby was sent on to the Baltimore Aquarium, where Alysoun Seacat assisted in the round-the-clock rescue effort. After devising a proper formula mixture, the rescue group was successful in getting the newborn whale to accept the formula through a nipple, but unable to keep her alive beyond three days.

Dwarf sperm whales are very rarely sighted, and practically nothing is known about them. The little that is known has come from infrequent strandings of mortally ill whales. Although stranded cetaceans (whales and dolphins) rarely survive, there is much of value to be learned with each individual case, and there is always the hope, against tough odds, that an animal can be saved.

In the case of two Atlantic Ridley sea turtles, stranded on a Long Island beach in December, Aquarium staffers helped beat the odds. Suffering from exposure and near-starvation, the turtles recuperated in the Aquarium's Bermuda Triangle exhibit. Atlantic Ridleys are one of the smallest and rarest species of endangered sea turtles and are found only in the Gulf of Mexico and along the eastern coast of the United States. It is likely that the first cold snap of the season caught them in shallow waters and numbed them. After successful recovery, the turtles were shipped to Florida for release into warmer coastal waters.

Capital projects

On Friday, March 21, 1986, the official groundbreaking ceremony was held for Discovery Cove, initiating construction of this extensive exhibition-education complex at the site of the Old Children's Cove. On hand to assist in the ceremony were Brooklyn Borough President Howard Golden and schoolchildren from District 21. Beluga whales performed, and the children demonstrated several of the innovative interactive exhibits that will be included in Discovery Cove.

Discovery Cove is based on learning concepts pioneered by the Aquarium's Education Department over the past few years. Though planned for the enjoyment and enlightenment of the general public, the exhibits will be directed especially to the dynamics of family interaction, to the natural learning processes that occur within families and among members of different generations.

Sea Cliffs, the ambitious exhibition being planned for marine mammals and birds, was to undergo a Value Engineering Study conducted by outside experts for the City's Office of Management and Budget. The study will determine the most efficient way to construct the project and to provide the best exhibition, living, and breeding facilities for walruses, seals, sea otters, and penguins.

The Seawater Intake System is complete and ready to go on-line in the fall of 1986. This new pumping and internal distribution system will provide the Aquarium with an efficient flow of natural seawater and has been designed to accommodate expanding future needs of the Aquarium's living collection.

Aquarium Education

A record of 138,098 schoolchildren in 4,676 organized groups, ranging from kindergarten through high school, attended the Aquarium during the year. The department ran classroom sessions and tours for

26,616 general audience children and adults. In addition, college level and postgraduate programs were offered, including workshops for teachers interested in marine sciences.

The popular "Beneath Noah's Ark" series of weekend workshops and classes offered thirteen new programs. With 1,600 participants enrolled in thirty-three courses, income doubled over last year.

"Childs Play/Fish Play," the Aquarium's first formal program for infants and toddlers, began in October 1985. These one-hour sessions, which give youngsters the opportunity to interact with small animals and to explore the underwater world up close, have already become so popular that additional sessions have been scheduled. Enthusiasm was also evident in the reviews of the adult participants, who were asked for written evaluations. Programming for this young age group will now be developed further by the Education Department in collaboration with experts in the field of early childhood education at Columbia Teachers College.

Other new family workshops included "Sea Vegetables," in which participants collected, identified, and pressed seaweed, and even prepared it as food under the guidance of seaweed specialist Lisa Breslof; the "Aquarium Collecting Expedition" with Curator Dr. Erwin Ernst; and "The Lure of Art from the Sea," with rope and knots expert John Hensel. Several sessions for teens and adults were devoted to scientific and conservation concerns. Dr. Jacque Carter, WCI Conservation Fellow, provided an inside look at his research around the Belize barrier reef. Dr. Betty Borowsky detailed her work at the Osborn Laboratories of Marine Sciences on some fascinating marine invertebrates. And Dr. Myron Jacobs offered his view as a neuroanatonist on "The Mind of the Whale."

The Aquarium's black-footed penguins produced seven chicks last year.

The department's links with New York's public schools were further strengthened by three important pilot programs. School districts 20 and 21 participated in the Mimi Project, so named for an old whaling ship, and sponsored by the New York City Board of Education Gifted and Talented Unit. This curriculum enrichment program for fourth-graders did indeed concern whales, combining computer programming developed by Bank Street College with lectures on and contact with whales at the Aquarium.

District 21 also sponsored an innovative training program designed to enhance the interest and confidence of junior high school students in their learning and teaching abilities. After being trained by the Education Department staff over several weeks, each student was assigned to an area in the Aquarium where he or she in turn helped to interpret the collections for elementary school students from the district. Worksheets devised by these junior guides were then used by the younger students in their subsequent classroom work.

An intensive, long-term program with junior high school students from District 14 was a resounding success during its first year and will be continued. The Education Department worked with one particularly creative and dedicated science teacher to develop this year-long series of workshops, lectures, collecting trips, and other participatory activities at the Aquarium. The success of the program is reflected in the students' enthusiasm, improved school grades, and dramatically increased attendance. For this involvement, the school instructor was chosen by a consortium of community leaders as the "Outstanding Educator" in 1986.

On the elementary level, model enrichment programs for New York City gifted and talented students in District 22 and 29 were developed at the Aquarium with science coordinators and teachers. The curriculum, designed especially for early childhood groups at the Aquarium and adjacent marine environment, involves not only the Aquarium staff, students, and teachers, but parents using a series of curriculum enrichment activities designed for the entire family. Over 1,800 students attended.

With construction underway, Discovery Cove is a focus of intense planning, for exhibitions as well as curriculum materials and interpretive graphics. The live animal habitats, dioramas, graphic and photographic displays, push-button demonstrations, participatory exhibits, and special classroom will greatly

Guided by instructor Shelly Beaird, students examine the microscopic plant and animal life they have collected on the beach.

expand and enrich the Education Department's curriculum, which will make use of Discovery Cove's resources on a daily basis when it is completed in 1988.

In May, the Aquarium, in conjunction with Gateway National Park and Kingsborough Community College, hosted the twelfth annual conference of the New York State Marine Educators Association. The site was particularly appropriate, since the group, which includes pre-school through university teachers, was started by New York Aquarium Education Curator Karen Hensel twelve years ago.

New York Aquarium Census (as of June 30, 1986)

Phylum	Class	Order	Species	Specimens
Chordata	Chondrichthyes—Cartilaginous fishes: Sharks, rays, chimeras	Heterondontiformes—Horn sharks	1	4
		Squaliformes—Typical sharks: Sand tigers, lemons	5	11
		Rajiformes—Rays	4	12
	Osteichthyes—Bony fishes	Acipenseriformes—Sturgeon, paddlefish	2	23
		Semionotiformes—Garfish	1	9
		Amiiformes—Bowfin	1	6
		Elopiformes—Tarpon	1	3
		Anguilliformes—Eels, morays	6	11
		Salmoniformes—Trouts	3	24
		Cypriniformes—Minnows, carp	1	8
		Siluriformes—Freshwater catfishes	2	24
		Batrachoidiformes—Toadfishes	1	31
		Gadiformes—Codfishes	1	1
		Atheriniformes—Platys, swordtails, killifish	2	70
		Beryciformes—Squirrelfishes	6	21
		Gasterosteiformes—Seahorses	2	18
		Perciformes—Perches, sea basses, porgies, cichlids	150	750
		Pleuronectiformes—Flatfishes	4	30
		Tetraodontiformes—Puffers, boxfish, triggerfish	10	60
		Dipnoi—Lungfishes	1	1
	Reptilia	Chelonia—Turtles	3	11
	Aves	Sphenisciformes—Penguins	1	53
	Mammalia	Pinnipedia—Seals, sea lions	3	16
		Cetacea—Whales, dolphins	2	8
Cnidaria	Anthozoa—Corals, anemones		30	20,000±
Annelida	Polychaeta—Marine worms		10	70
Arthropoda	Crustacea—Lobsters, shrimps, crabs, isopods		16	123
	Arachnida—Horseshoe crabs		1	10
Mollusca	Gastropoda—Snails		5	25
	Pelecypoda—Bi-valves		4	11
	Cephalopoda—Octopus, nautilus		13	35
Echinodermata	Asteroidea—Starfish		13	78
	Holothuroidea—Sea cucumbers		5	18
	Echinoidea—Sea urchins		5	109
Totals			**315**	**21,779±**

Osborn Laboratories of Marine Sciences

Xiphophorus continuum

Fish Geneticist Dr. Klaus Kallman has conducted genetic research on aging, sex determination, and disease control for more than thirty years, through some seventy-five generations of platyfish and swordtails (*Xiphophorus*). Important aspects of the work, in the field and in the lab, have been collaborative, involving such institutions as the American Museum of Natural History and the University of Texas. In January, for instance, the Genetics Department supplied over 700 platyfish and swordtails to the Cancer Center at the University of Texas and the Virginia Polytechnic Institute for basic cancer research.

Another ongoing aspect of collaboration concerns the distribution of *Xiphophorus* species in their natural range, concentrating on the little explored Rio Panuco basin in eastern Mexico. It was learned early that nine species rather than five occur in this region. Together they constitute a very distinct faunal element of the Sierra Madre, present in virtually every stream between the edge of the plateau and the coastal plain but penetrating neither. With but two exceptions each stream is inhabited by just one species of swordtail. Especially in the northern tributaries, the fish were found to be highly differentiated genetically, indicating that they have been isolated from each other for a long time. Many of the streams end blindly in limestone sinks, and others are isolated by large waterfalls up to 300 feet in height. The fish may have occupied this entire area before these barriers arose.

Today, the search continues, with two new populations of swordtails—*X. cortezi* and *X. montezumae*—discovered in the wild during the past year. Ultimately, the goal is to establish a phylogeny for the *Xiphophorus* family that takes into account not only their biochemical and morphological differences but also past geological events in this region.

Under pressure

Through the efforts of NYZS Trustee Nixon Griffis, a high-pressure aquarium system developed at the University of North Carolina has been installed at the Osborn Labs. Capable of producing the pressures of sea depths up to one mile, it is the only such system currently in operation at any aquarium facility in the world. The Labs' model was exhibited at the American Association for the Advancement of Science annual meeting in Philadelphia in May.

The high-pressure aquarium has been designed both for research and the exhibition of deep-sea creatures, which can be maintained for long periods without the need to break pressure for feedings or changing and filtering water. It is currently being used by Dr. John Chamberlain to evaluate the effects of pressure on the buoyancy control and behavior of the chambered nautilus. In order to exhibit other deep-water animals at the Aquarium, a larger unit, better designed for visitor-viewing purposes, is currently under construction.

Double vision

As mollusks and as invertebrates, octopus and squid are unusual in having eyes like vertebrates and elaborate systems of extraocular photoreceptors. In addition, their pineal glands, upon which the photoreceptors are located, have many features in common with those of frogs and lizards.

Concerning these organs, studies conducted at OLMS by Dr. Alexander Mauro of Rockefeller University have already shown that the Pacific octopus responds in a very patterned way to twenty-four-hour light-dark cycles. This pattern of response, known as circadian rhythm, is now being studied in the Mediterranean octopus to gain additional information on activities conditioned by light and dark. Further research, bypassing the octopus's ocular vision, will determine whether its extraocular photoreceptors play a role in maintaining this circadian rhythm.

Pathology

Because aflatoxin causes hepatomas in trout but does not induce liver cancer in closely related salmon, multiple studies were undertaken by Pathologist Dr. Paul J. Cheung in an attempt to unravel some of the mysteries of this potent hepatocarcinogen. Freshwater platyfish, African cichlids, and marine fishes such as striped bass, northern puffers, sea robins, and killifish, were fed diets containing various concentrations of aflatoxin. At low doses, all the fish, freshwater and marine, became anemic but none developed liver cancer. At high concentrations, they all died from severe anemia. The hematopoietic (blood-forming) organs were grossly compromised. The only effect on the liver of these fishes was a fatty infiltration. Other studies will evaluate the effect of this toxic agent on the reproductive potential in fish.

City Zoos Project

Central Park Zoo

In a little more than a year after construction began on the new zoo, all the building shells were completed and interior work on mechanical systems and exhibitions was well underway. Artificial rockwork was finished in the Central Garden's Sea Lion Pool and in the Edge of the Ice Pack building, where penguins will live in a refrigerated panorama replicating their Antarctic habitat, and smaller exhibits will be devoted to puffins and snowy owls. There was also dramatic progress in the Tropic Zone building, the polar bear, seal, and arctic fox exhibits, and the lake island for Japanese snow monkeys in the Temperate Territory. Giant artificial trees similar to those in the Bronx Zoo's JungleWorld were fabricated off-site and installed in the Tropic Zone's rain-forest aviary. Linking all these areas, the great colonnaded walkway was in an early stage of construction.

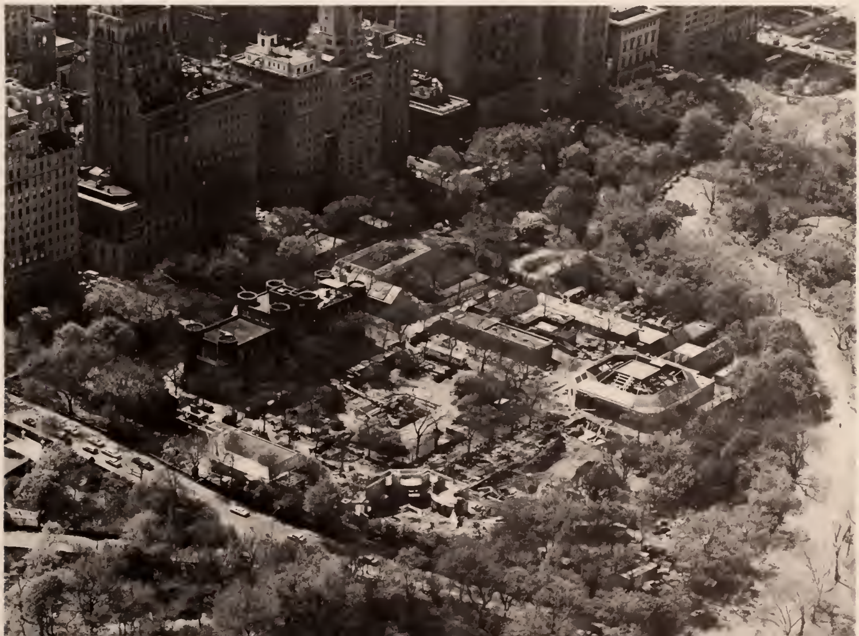
The architectural scheme includes other new buildings—for the animal clinic, visitor services, and part of the restaurant—and several existing buildings renovated for new uses, among them the old Monkey House for the Heckscher Zoo School, the old Bird House for the Zoo Gift Shop, the Small Horned Animals Building for various offices, and the Horned Animals Building for another part of the new restaurant. Last to be completed will be offices for the zoo staff on the first floor of the Arsenal Building. Meanwhile, a small cadre of City Zoos Project staff were preparing to occupy one of the renovated buildings for the purpose of supervising exhibit construction and organizing the acquisition of animals.

One of the compelling attractions of the new zoo will be a troop of beautiful and rare golden monkeys from the People's Republic of China. Investigation into other animal acquisitions has begun, focusing on penguins as the first priority. With the Edge of the Icepack nearing completion, it would soon be possible to test animals in the climate-controlled environment.

Prospect Park and Flushing Meadows zoos

At the request of the New York City's Office of Management and Budget, Value Engineering Studies were initiated for the Prospect Park Zoo and were about to begin for the Flushing Meadows Zoo. An independent team advised by both the Department of Parks and Recreation and the Zoological Society is conducting the studies, which should help to strengthen the final design phases of both projects and keep them within budget.

Fifth Avenue residents have a birds-eye view of Central Park Zoo construction.



Wildlife Conservation International

Field projects supported by Wildlife Conservation International, including 59 of them in 30 nations during fiscal year 1986, are directed in a variety of ways to preserving wildlife and wild places around the world. They seek to expand our knowledge of endangered species and ecosystems, to help create and maintain parks and reserves, to establish guidelines for wildlife management, to heighten public awareness through education, and to train scientists and other professionals for the tasks of conservation in their own countries.

The past year has seen important developments in the coordination of these efforts. Interaction between WCI and other divisions of the New York Zoological Society, already extensive in the areas of captive breeding, environmental education, and research in nutrition and reproduction biology, has been further strengthened by the establishment of an interdisciplinary committee to explore new ways of linking field projects with the resources of the Zoo, Aquarium, Osborn Labs, and Wildlife Survival Center.

In the field, a more coherent and comprehensive approach to conservation problems is beginning to emerge in Southeast Asia, South America, and Africa, where four associate research zoologists have been added to WCI's full-time staff of conservation biologists. The coordination of projects in terms of their regional and international implications, as well as local and national realities, should enhance the overall effectiveness and impact of WCI's program in the years to come.

Southeast Asia

Conservation in this sprawling area poses difficult administrative challenges for a field-oriented organization like WCI. In our definition, the region includes the most populous nation on earth, the People's Republic of China, and extends southward through Nepal, India, and Southeast Asia proper to the islands of Indonesia and Papua New Guinea. It encompasses a variety of cultures, language groups, and political systems in a diversity of biomes, from the Himalayan plateau to deep tropical rain forest. WCI has supported conservation research in the area for decades. But these efforts required more cohesion, and additional staff attention was therefore directed to the region, beginning this past year.

On the Tibetan plateau, WCI Director Dr. George Schaller continued his five-year survey of that area's wildlife; he has already begun to bring images of the land and its problems to the western world. Dr. Schaller also serves in the crucial role of counseling WCI headquarters and the NYZS on the giant panda recovery project he previously directed in China; on promising new projects including research into the beiji, or Chinese river dolphin; and, in southwestern China, on the development of research devoted to endangered primates.

Dr. Alan Rabinowitz, one of the four new WCI associate research zoologists, will provide broad, regional expertise in Southeast Asia while conducting an important study of his own. Fresh from three years in Belize, where his work resulted in the creation of a jaguar reserve, he will now investigate the behavior and ecology of the elusive and beautiful clouded leopard. Following a preliminary survey in 1986, he is considering Thailand as his new home base.

Already based in Thailand is WCI Conservation Fellow Dr. Warren Brockelman, a professor at Mahidol University in Bangkok, where he is in charge of a WCI-sponsored program to enhance the training of Thai graduate students in field biology. This important initiative is part of a comprehensive effort, recently funded by The J.N. Pew Jr. Charitable Trust, to train Asian and African conservationists in conjunction with WCI field projects.

In Papua New Guinea, WCI draws on the expertise and guidance of Bronx Zoo Curator of Ornithology Dr. Donald Bruning, who was instrumental in establishing Crater Mountain Wildlife Management Area and the Conservation Foundation of Papua New Guinea. Dr. Bruning is concerned with salvaging additional protected areas from land condemned to strip-mining and clear-cutting, managing captive birds of paradise and surveying their habitat, training local personnel, and encouraging a fledgling tourist industry.

Charged with coordinating and giving direction to all Southeast Asian activities, staff and non-staff projects, is Dr. Mary Pearl. To this end, she began a journey through the region in June to assess opportunities and priorities in Sri Lanka, Thailand, Taiwan, and China.

South America

In January 1986, two tropical ornithologists, Dr. Stuart Strahl and Dr. Charles Munn, became WCI's new associate research zoologists in Latin America. They inherit a tradition of NYZS involvement in the area that has evolved since William Beebe began his investigations early in the century.

Dr. Strahl has been posted to Venezuela, where he works in the woodlands of the llanos on a variety of endangered birds. On behalf of WCI, Strahl conducts

WCI Research Fellow James Powell is providing the first useful information on the West African manatee, which is as endangered in the Ivory Coast as this Caribbean manatee is in Florida.

or oversees work on spectacled bears in the mountains of the west, oilbirds in the caves of the northeast, hoatzins in wetlands of the llanos, flamingos on the Caribbean coast, and several species of the cracid family of guans, currasows, and chachalacas in habitats around Venezuela. Dr. Strahl is also designing new conservation education programs for college students and is an advisor to FUDENA, the country's senior conservation organization.

In March, Dr. Strahl joined WCI Assistant Director Dr. Archie Carr III for a site visit to the remote field station of WCI Research Fellow Dr. Thomas Defler in the Amazonian forests of Colombia. Dr. Defler, who specializes in the biology of woolly monkeys, is seeking to secure a 500,000-acre portion of the Apaporis River drainage as a refuge for primates and other wildlife. Tactics were discussed to advance the Apaporis plan in light of the newly elected and promising central government.

Also in the Amazon Basin, but south of Defler's site, Dr. Munn is working in the Manu National Park of Peru, where he has been active since 1976. This vast forest, part of a 4.5-million acre Biosphere Reserve, is considered to be among the biologically richest in the world, with 8,000 species of flowering plants, 600 of butterflies, and 800 of birds.

In addition to his scientific research on the ecology of macaws, Dr. Munn has nurtured a small conservation group into a creditible force for progressive management of the park and surrounding lands, an area approximately the size of Massachusetts. In recognition of its performance and promise, the group was awarded a three-year grant by the John D. and Catherine T. MacArthur Foundation, to be administered by WCI. Dr. Munn's initiatives in Manu, including public education, park warden training, and research on the life styles and survival requirements of forest-dwelling Indians, also received nearly $57,000 from the Jessie Smith Noyes Foundation.

Other staff members were active in South America as well. NYZS General Director Dr. William Conway visited Argentina, where WCI continues in its traditional role as the principal foreign supporter of conservation biology, concentrating especially on Magellanic penguins and Patagonian sea lions. Dr. George Schaller, home from China for three months early in 1986, visited the altiplano in the Chilean Andes, where WCI is embarked upon a multi-year

WCI Director George Schaller witnessed the plight of Tibetan antelope and other wildlife after the most severe blizzard on the Tibetan Plateau in thirty years.

program of flamingo research and highland management with CONAF, Chile's remarkably sophisticated foresty and parks agency. And Dr. Mary Pearl represented WCI at a conference in March, convened in Argentina by the Commission on National Parks and Protected Areas of the IUCN to consider priorities in protected area management throughout the Latin American region.

In Central America, Dr. Carr maintained his interest in the advancement of conservation in Belize. In March he participated in a ceremony surrounding the formal declaration of a protected area for jaguars in the Cockscomb Basin, a goal long sought by Carr and Dr. Alan Rabinowitz. He also offered encouragement to the marine initiatives in Belize, directed by Research Fellow Dr. Jacque Carter, which have led to the possibility of establishing a marine park within the barrier reef system before the close of 1986. Wildlife education in Belize was given a boost with the introduction of *Wildlife Inquiry Through Zoo Education* (WIZE), the innovative sixth-through-twelfth-grade curriculum developed by the Bronx Zoo's Education Department. Belizean teachers were trained both at the Bronx Zoo and in Belize by Education staff members.

Africa

The new WCI staff scientist in Eastern Africa, where NYZS has contributed to wildlife conservation for more than sixty years, is zoologist and jackal expert Dr. Patricia Moehlman. With generous support from the Muskiwinni Foundation, she is stationed in the fabled Ngorongoro Conservation Unit, a large subset of the Serengeti ecosystem in Tanzania.

This country, with the greatest concentrations of "big game" on the continent, has indicated a serious intent to restore the professional atmosphere that once characterized its park and wildlife agencies. WCI's response, under the direction of Dr. Moehlman and Nairobi-based Dr. David Western, includes a pledge to launch research in the Selous Wildlife Refuge (the largest protected area in Africa) and hoofed-stock surveys and behavioral research in the northern Serengeti by Dr. A.R.E. Sinclair, a long-time associate of WCI.

Dr. Western has also been given the key role in coordinating an array of projects launched in recent years by WCI in the forested heart of the continent, from Sierra Leone to Uganda. The immense forests, which have been less drastically threatened than tropical rain forests in other parts of the world, are now coming under severe pressure, both from timbering and clearing and from meat and ivory hunters. It is the purpose of WCI to alter this course of destruction with a concerted effort that now includes studies of gorillas in Rwanda and Central African Republic, forest elephants in Gabon, and pygmy chimpanzees and okapi in Zaire. Through such long-term studies as those conducted by WCI Research Zoologist Dr. Thomas Struhsaker in the forests of western Uganda, WCI is establishing approaches to land development and management in equatorial Africa that can serve the needs of people as well as wildlife in these emerging nations.

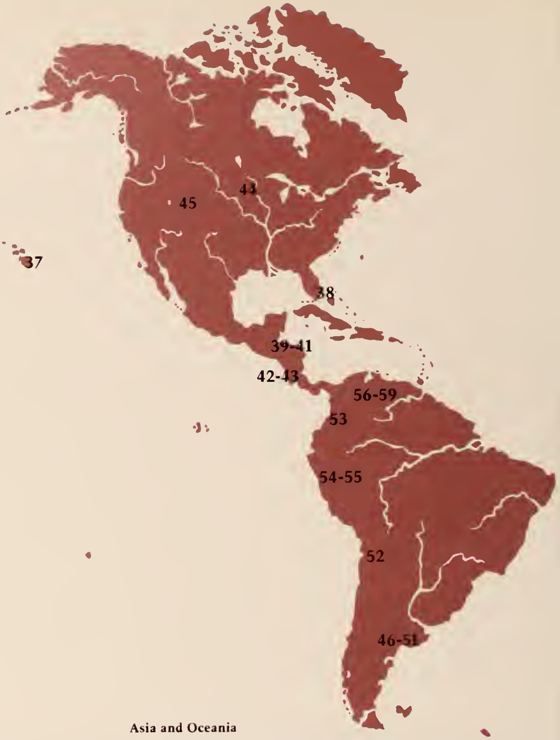
Peruvian schoolchildren learn about the wildlife of Manu National Park in classes sponsored by WCI.

Conservation 2100

Complementing its work in the field, WCI completed plans to host its first international conference on the major issues of global conservation. Scheduled for October 20-23 in New York City, the conference was conceived by Dr. David Western and organized by Dr. Mary Pearl, aided by project coordinator Martha Schwartz.

Conservation 2100: A Fairfield Osborn Symposium will bring together forty-one prominent professionals in conservation biology, wildlife management, demography, economics, philosophy, sociology, botany, law, industry, and the media to discuss the accelerating destruction of the earths's biosphere and to outline an agenda for conserving nature into the twenty-first century. Sessions devoted to current ecological trends, strategies of scientific research, wildlife and ecosystem management, and political, cultural, and economic contexts, will focus on uncertainties as well as pivotal points in trying to establish a mandate for future conservation.

Geographic Distribution of WCI Projects

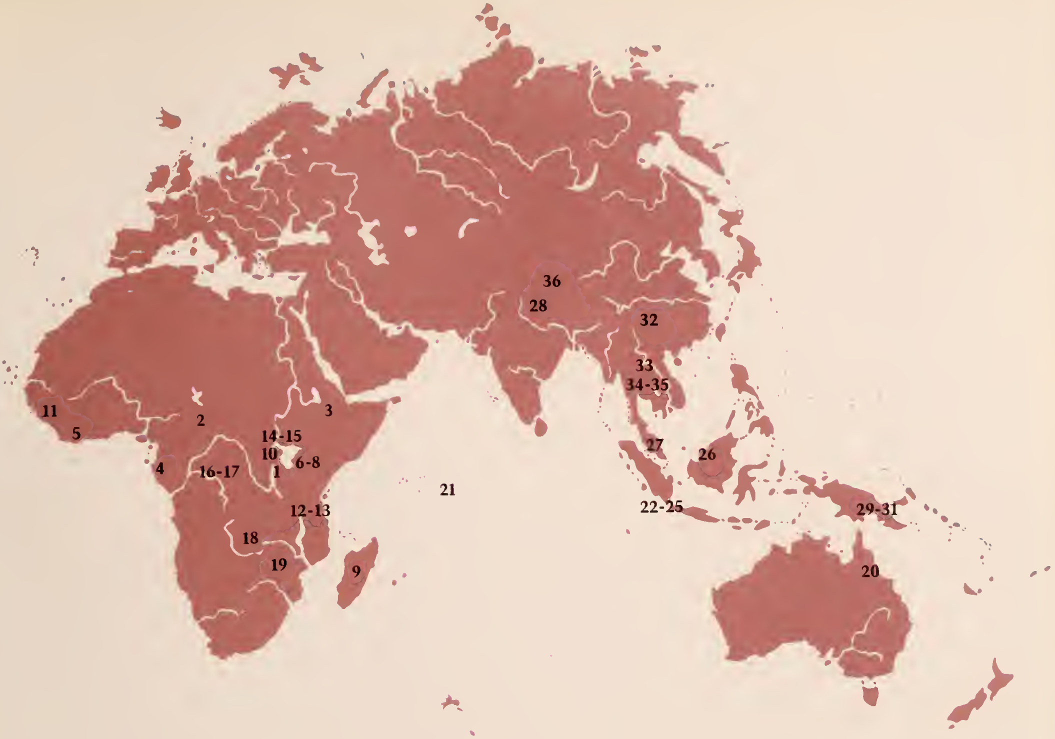


Africa

1	Wildlife Inventory, Kibira National Park	Peter Trenchard *Burundi*
2	Lowland gorilla status and reserve	Richard Carroll *Central African Republic*
3	Ecology of the mountain nyala in Bale Mountain National Park	Chris Hillman *Ethiopia*
4	Forest elephant	Richard Barnes *Gabon*
5	West African manatee	James Powell *Ivory Coast*
6	Zoological monitoring in Amboseli National Park	David Western *Kenya*
7	Capital improvements in Amboseli National Park	Government of *Kenya*
8	Tana River primate conservation	M. Kinnaird, K. Medley, B. Decker, & P. Murphy *Kenya*
9	Hapelemur survey	Patricia Wright *Malagasy Republic*
10	Afromontane forest conservation	Amy Vedder *Rwanda*
11	Forest designation and conservation	John Oates *Sierra Leone*
12	Ungulate survey in Serengeti-Mara	A.R.E. Sinclair & Holly Dublin *Tanzania*
13	Jackal ecology and Ngorongoro conservation area	Patricia Moehlman *Tanzania*
14	The Kibale Forest Project	Thomas Struhsaker *Uganda*
15	Forest surveys	Thomas Struhsaker & Peter Howard *Uganda*
16	Pygmy chimpanzee	Randall Susman & Richard Malenky *Zaire*
17	Okapi ecology and behavior	Terese & John Hart *Zaire*
18	Elephant management in Luangwa Valley	Dale M. Lewis *Zambia*
19	Support for African elephant and rhino	David Cumming *Zimbabwe*

Asia and Oceania

20	Mammals of the subtropical rain forest	William Laurance *Australia*
21	World tortoise survey and Madagascar tortoises	Ian Swingland *Indian Ocean*
22	Effects of forest fire and drought	Judith Campbell *Indonesia*
23	Tropical ecology	Mark Leighton *Indonesia*
24	Primates of South Mentawi Islands	Richard Tenaza *Indonesia*
25	Bali mynah conservation	I.C.B.P. *Indonesia*
26	Proboscis monkey	Elizabeth Bennett *Malaysia*
27	River terrapin	Edward Moll *Malaysia*
28	Fish ecology	David Edds *Nepal*
29	Macgregor's bowerbird	Bruce Beehler *Papua New Guinea*
30	Crater Mountain Park	*Papua New Guinea*



31	Student support	*Papua New Guinea*
32	Giant Panda Project	Donald Reid *People's Republic of China*
33	Environmental education	James Connor *Southeast Asia, Africa*
34	Conservation coordination and student support	Warren Brockelman *Thailand*
35	Clouded leopard survey	Alan Rabinowitz *Thailand*
36	Wildlife surveys	George Schaller *Tibet*
37	Humpback whale studies, Hawaii	Deborah Glockner-Ferrari *USA*

Central America and the Caribbean

38	Bahamas parrot study	Rosemarie Gnam *Bahamas*
39	Comprehensive planning	Archie Carr III *Belize*
40	Nassau grouper and Barrier Reef research	Jacque Carter *Belize*
41	W.I.Z.E. Project	Annette Berkovits *Belize*
42	Leatherback turtle	Harold Hirth *Costa Rica*
43	Quetzal habitat protection	Carlos Guindon *Costa Rica*

North America

44	Captive propagation	Ulysses S. Seal *USA*
45	Black-footed ferret, Wyoming	Tim W. Clark *USA*

South America

46	The Magellanic penguin at Punta Tombo	Dee Boersma & William Conway *Argentina*
47	Sea lion study	Claudio Campagna *Argentina*
48	Support for Patagonian conservation	William Conway *Argentina*
49	Valdes wildlife book	Graham Harris *Argentina*
50	Oiled penguins	ECOBIOS *Argentina*
51	Cetacean strandings	Hugo Castello & Alfredo Lichter *Argentina*
52	Flamingo conservation	Ivan Castro & Mario Parada *Chile*
53	Primates of the Apaporis River Basin	Thomas Defler *Colombia*
54	South American fur seal	Patricia Majluf & Pedro Vasquez *Peru*
55	Ecology of Amazon parrots	Charles Munn *Peru*
56	Guans, curassows, and oilbirds	Stuart Strahl *Venezuela*
57	Flamingos	Miguelino Lentino, Mary Lou Goodwin & Stuart Strahl *Venezuela*
58	Orinoco crocodile captive breeding	John Thorbjarnarson & Tomas Blohm *Venezuela*
59	Spectacled bear survey	Isaac Goldstein & Edgard Yerena *Venezuela*

Public Affairs

In each of its major functions—fund raising, membership, public relations, and advertising—the Public Affairs Department surpassed its goals and recorded a number of significant achievements. Solid gains were made in much-needed operating support, with particularly encouraging results for Wildlife Conservation International and the Animal Health Department. Capital funding enabled construction to proceed on four major projects at once. Membership continued to grow, and rising attendance, particularly at the Aquarium, was attributable in good measure to long-standing advertising efforts.

Capital funds

The total of $4,922,575 raised during the year included contributions that brought funding for the Central Park Zoo and the Bronx Zoo's Elephant House and Himalayan Highlands exhibition close to completion.

With construction at the Central Park Zoo well underway, several significant gifts were received, reducing the funding deficit to approximately $1 million. Milton and Carroll Petrie pledged $1 million for the Tropic Zone building, which will be named in their honor. Funds associated with the late Lila Acheson Wallace, which have been vital to the new zoo's design and construction over several years, contributed $1.393 million during the past year. And The Kresge Foundation awarded a challenge grant of $400,000 to help complete funding for the zoo.

The Dunlevy Milbank Foundation, a long-time supporter of NYZS conservation and capital projects, contributed $250,000 to the Aquarium's innovative new Discovery Cove, also under construction. Other gifts to the project included $60,000 from the Barker Welfare Foundation.

At the Bronx, Zoo, funding neared completion for the Elephant House renovation with a gift of $1 million from the Robert Wood Johnson 1962 Charitable Trust. The Himalayan Highlands, due to open in September 1986, received an additional $130,000 from the Society's Women's Committee for the red panda and white-naped crane areas of the exhibition, and $50,000 from the Prospect Hill Foundation, among other gifts.

Budgetary funds

Individuals, private foundations, and corporations contributed $3,076,371 for general operating support of the New York Zoological Society's diverse programs. Gifts and pledges for endowment purposes totaled $76,307, and bequest contributions came to $778,061. Net proceeds from related fund-raising benefits totaled $214,000.

Under the continued co-chairmanship of John Chancellor and Trustee John Elliott, the Annual Patrons campaign reached an all-time high of 294 subscribers. Now in its fifth year, this highly successful program, including additional donations by Patrons, raised over $438,550 in operating support.

Trustees Arthur Hauspurg and Peter C.R. Huang, co-chairmen of the Society's Business Committee, were once again successful in securing gifts of $1,000 or more from over 100 corporations. The business community continues to provide significant underwriting for the Society's education, public relations, and nutrition programs.

A total of 144 private foundations generously contributed $1,513,814 in operating support. Major funding for the Society's Wildlife Survival Center on St. Catherines Island, Georgia, was received from The John Edward Noble Foundation, and Animal Health Center programs were awarded substantial grants by the Marilyn Simpson Charitable Trust and the Jessie Smith Noyes Foundation.

Guest services for the development division managed 49 meetings, luncheons, tours, and briefing sessions. These special events brought more than 3,300 people to the Zoo, Aquarium, and other New York locations.

Continued significant support from the Women's Committee was produced by several fund-raising activities, highlighted by "Zooesta," a spring gala at the Zoo attended by 500.

The Aquarium and Osborn Laboratories Planning Committee, chaired by Trustee Henry Clay Frick II, provided leadership that resulted in contributions of $242,102 for these important divisions of the Society, which continued to enjoy steady growth and renewal.

Conservation funds

The development campaign for the Society's international conservation program—Wildlife Conservation International—raised its active donor base to 20,000, an increase of twenty-five percent over last year.

Trustee John Pierrepont, Chairman of the Conservation Committee, reported that gifts for operating support totaled $1,121,630, including $384,534 from individuals, $639,315 from foundations, and $97,781 from corporations. Of particular significance were three foundation grants from new conservation donors—$180,000 from the Muskiwinni Foundation for the work of Dr. Patricia Moehlman in Tanzania, $140,000 from the J.N. Pew Charitable Trust for training conservation personnel in Africa and Asia,

Kermit the Frog and puppeteer Jim Henson learned about the eating habits of screech owls in a chat with Children's Theater Instructor Ann Thayer at the Children's Zoo.

Walrus weigh-in: The correct answer for the "Guess Nuka's Weight" contest was 838 pounds.

and $56,000 from the Jessie Smith Noyes Foundation to support ecological research in tropical Peru.

Plans to include Wildlife Conservation International in the Society's efforts to attract estate and planned gifts were initiated with the inclusion of promotional information in all renewal mailings and in the WCI newsletter. Bequests received during the past year included gifts from the estates of Walter Bense and Ruth Schreiber. Endowed funds for WCI presently stand at $14,582,659.

Membership

By June 30, 1986, there were 28,610 members of the New York Zoological Society, representing a fifty percent growth in the past five years. The six percent increase over last year is primarily a result of successful direct-mail campaigns and increased sales within the Zoo itself. Membership dues added $1,429,417 to the Society's annual income.

Members' participation in NYZS events and volunteer days also continued to grow. More than 5,000 people attended the afternoon and evening sessions of the Annual Meeting at Avery Fisher Hall, and more than 600 helped with the spring clean-ups at the Zoo and Aquarium. The Annual Garden Party attracted a record 13,100 members over two nights.

Membership went on-line with the Society's new computer system. With the conversion came new membership cards, passes, and renewal notices that will soon be familiar to all members.

The Animal Health Fund Endowment started the fiscal year at approximately $124,000. Thanks to the support of our donors—members and nonmembers—the Fund had grown to almost $200,000 by the end of the year. With the new Animal Health Center in its second year of operation, the Fund has become essential to the Society's clinical services for the Zoo, Aquarium, and Wildlife Survival Center.

Public Relations, Advertising, and Special Events

During its first full year of operation, JungleWorld continued to attract worldwide media attention and to serve as a focus for advertising the Society and the Bronx Zoo. Articles appeared in a number of magazines and newspapers, including *Travel and Leisure, Vogue, Family Circle, Promenade,* and the *San Francisco Examiner Chronicle. The New York Times* gave special attention to the Chase Manhattan JungleLab, the unique classroom within the exhibition, and NBC's "Today Show" conducted a "live" tour of the building with General Director William Conway. JungleWorld was also the subject of award-winning radio spots and a series of television commercials.

Other advertising highlights included public service print ads and radio spots featuring George Plimpton on behalf of Wildlife Conservation International. The Philip Morris Company continued its generous support of the Society's outdoor advertising campaign for the Zoo and Aquarium by contributing space on 275 taxi-tops and 74 billboards throughout the City. Print and radio campaigns were also implemented for the travel, education, and Friends of the Zoo programs, and a new television commercial was made to promote the Aquarium.

For the second straight year, the staff handled over 500 tours, interviews, and other media activities. Among them were several special occasions at the Zoo: the debuts of baby gorillas Tunko and Tumai and baby rhinoceros Ella, the annual Children's Zoo opening, and a spring visit to the Zoo by Kermit the Frog for a "Good Morning, America!" appearance on ABC television. At the Aquarium, Nuka the walrus continued to play her role as media superstar and received wide coverage during the "Guess Nuka's Weight Contest."

Public information programs—the distribution of brochures, quarterly calendars, and "Let's Keep in Touch" cards—were expanded to include the New York City school and library systems. Promotions with radio stations and corporations were developed to increase awareness of and attendance at the Zoo and Aquarium.

The fourth annual Zoo Mask Weekend took place in May. Thousands arriving as kids left as zebras, tigers, and cheetahs. Make-up artists painted faces while children participated in games on Astor Court, and storytellers, musicians, and dancers representing cultures from around the world entertained throughout the Zoo.

Travel program

As in previous years, international travel for NYZS members involved field research projects being conducted by Wildlife Conservation International conservation biologists. Led by Curator of Ornithology Donald Bruning, a small group was helicoptered into Papua New Guinea, where the Society has helped to create reserves for birds of paradise and other wildlife. At Punta Tombo in Patagonia, Argentina, volunteers worked with WCI Research Fellow Dr. Dee Boersma, banding Magellanic penguins as part of the Society's research program in that area. The Kenya and Tanzania Safari, led by Education Chairman Richard Lattis and Curator James Murtaugh, visited Amboseli Park and other sites where NYZS conservationists have been working for many years. In Tortuguero, Costa Rica, five teams, under the guidance of Herpetology Department personnel, assisted scientists by tagging turtles. Domestic trips included two whale-watching expeditions and a visit to the Wildlife Survival Center on St. Catherines Island by NYZS Annual Patrons.

Members at the Annual Meeting in Avery Fisher Hall were introduced to a young American alligator.

Publications Department

Special issues

Two special single-theme issues highlighted *Animal Kingdom*'s editorial year. The most recent, March/April, focused on one of the Society's major activities: field research and its instrumental role in wildlife conservation. The entire issue was devoted to projects funded by the Society's Wildlife Conservation International, with WCI field scientists reporting on jaguars in Belize, penguins in Argentina, elephants in Zambia, bongo antelopes in the Sudan, bison in the American West, and primates in Uganda's Impenetrable Forest.

Earlier in the year, the September/October issue explored the theme of discovery. Accounts of a "new" species of sunbird and a subspecies of monkey confirmed that, despite the degree of exploration in the modern world, it is still possible to find animals previously unknown to science. Other articles related the rediscovery of a crane species and a toad that had been thought extinct, and the cover story called attention to the rare takin, a large shaggy hoofed mammal all-but-unknown outside its native mountain habitat in south-central Asia.

Circulation growth and verification

The Special Discovery Issue also served as a premium in the January direct-mail subscription promotion and, apparently, helped to set new standards of success for such campaigns. This mailing yielded the highest percentage of return, the most total orders, and the largest number of cash (as opposed to "bill-me") orders in the magazine's history. An earlier promotion in July and renewal campaigns also contributed to increasing the number of direct, general subscribers not affiliated with any zoological society to its highest total ever. Participating zoological societies, now numbering 38, continued to be the largest source of circulation.

Although circulation has grown dramatically in recent years, any statement about the number of subscribers has been based on the publication's own records. Despite honest reporting, that form of documentation—in the eyes of potential advertisers—lacks the credibility of an audited statement prepared by an independent agency. To acquire the necessary authentication, *Animal Kingdom* this year became a member of the Business Publications Audit of Circulation (BPA). Near the close of the fiscal year BPA issued its first "selected market audit" for *Animal Kingdom:* for the six-month period ending December 1985 average paid circulation was 144,335 and for the November/December issue it reached 148,949, another high-point in the magazine's history. Geographically, the largest number of readers are in the Pacific states, with 23.8 percent of circulation, followed by the Middle Atlantic states with 22.4 percent.

Perspective on reader tastes

Audience research in previous years has provided considerable demographic information about the age, income, educational attainments, and personal preferences of *Animal Kingdom*'s readers. This year Mark Clements Research was commissioned to conduct a series of studies on readers' tastes in regard to editorial aspects of the magazine. In the first study, completed near the close of the fiscal year, 82.9 percent of the respondents rated the overall contents of the aforementioned March/April Field Research and Conservation Issue "very satisfying," well above the 60 percent level that is the industry standard for reader approval. At least three issues must be surveyed to establish "norms" for any given magazine, so a clearer picture will not emerge until well into the next fiscal year. As part of the ongoing process, the editors are gaining valuable insights that should help to increase subscriber involvement and improve renewal rates.

Photographic services

JungleWorld has become the most thoroughly photographed exhibition in the Society's history. The pictorial record includes not only 1,100 color slides of the building and its construction, but comprehensive coverage of JungleWorld's animal inhabitants, its botanical aspects, and its visitors, notably children attending classes in JungleLab. The photography staff also produced a motion picture documenting design and construction of the building's exhibits. The film premiered at the annual members' meeting and is now being used in Education Department classes.

All told, 2,000 color and 1,000 black-and-white photos were added to the photo library. From its total inventory the library produced and distributed more than 3,000 color slides and some 6,000 black-and-white prints to Society staff members and outside publications.

During the spring, Associate Curator Bill Meng and Associate Photographer Dennis DeMello took to the air over the Bronx and Manhattan. The resulting series of aerial photographs of the Bronx Zoo and construction at the new Central Park Zoo has already been widely used in NYZS publications and slide presentations. Meng also traveled to the Wildlife Survival Center on St. Catherines Island to record the ring-tailed lemur and sandhill crane release programs in both motion-picture film and still photographs.

Admissions, Parking, and Transportation

Bronx Zoo attendance rose to 2,267,940, partly due to the attraction of JungleWorld, which drew 688,405 visitors during its first full year of operation. With an aggressive target market program, group sales continued to make impressive gains, accounting for 120,430 visitors. The New York Aquarium's attendance of 621,547 capped a 50 percent increase over five years.

Nearly 1.4 million visitors rode on intra-Zoo transportation. The Bengali Express monorail carried 604,673 passengers, reflecting an increase attributable primarily to the proximity of JungleWorld. Both the Safari Tour Train and Skyfari were up slightly from last year, carrying 320,084 and 447,594 passengers, respectively. Modernization of the Skyfari towers, including conversion of the roller batteries, was completed during the year.

Food and Souvenirs

With sales up for food and souvenirs, these services continued to make substantial contributions to Bronx Zoo revenues. Particular attention was given to improving service stand and mobil unit sales.

Rainey Gate Ticket Agent Howard Corbett was presented with a 1986 "Big Apple Award" by Charles Gillette, President of the New York Convention and Visitors Bureau (right), and Robert Tisch, now Postmaster General of the United States (left).

The cafeteria, where substantial repairs to the staff dining room were carried out during the winter, has become the focus of the overall plan to modernize the Zoo's eating facilities. Preliminary plans call for a new and larger building extending toward the Wildfowl Pond as part of the renovation of both areas. Included will be a new staff dining room and a modern kitchen capable of supporting a major catering operation.

Personnel

On June 30, 1986, there were 461 full-time New York Zoological Society staff members (listed by department on pages 69-72) working at the Bronx Zoo, New York Aquarium, Osborn Laboratories of Marine Sciences, Wildlife Survival Center, and Wildlife Conservation International.

The Zoo and Aquarium also employed 656 seasonal workers from April through October to assist with admissions and parking, selling food and souvenirs, maintaining the grounds, and guiding tours on the Bengali Express monorail and the Safari Tour Train. For many of these young people from the Bronx, Brooklyn, and elsewhere, this was their first job; others have returned year after year while finishing their high school or college educations.

The department has established a training program designed to provide inner-city youth with practical skills in retail sales and food service. This twelve-hour curriculum, funded in part by the DeWitt Wallace Fund and the Bernhill Fund, is expected to reach as many as 400 young employees of the Zoo and Aquarium starting in the spring of 1987.

Department members were cited this year by the Westchester Community Opportunity Program and the Office of the Mayor of the City of New York for their efforts on behalf of the training and placement of minority and disabled persons.

1985-86 Publications and Papers by NYZS Staff and Associates

Anderson, E.; Forrest, S.C.; Clark, Tim W.; and Richardson, L. 1986. Paleobiology, biogeography, and systematics of the black-footed ferret, *Mustela nigripes*, (Audubon and Bachman), 1851. *Great Basin Naturalist Memoirs* 8:11-62.

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Report of the Treasurer

In fiscal 1986, New York Zoological Society expenditures exceeded revenues by $71,554. Expenditures were $29,856,091 for general purposes and $4,235,708 for capital improvements.

Contributions from individuals, foundations, and corporations provided twelve percent of total operating support and revenue. Fund-raising efforts produced more than $9,000,000 for operating, capital improvements, and endowment. Included in this amount are pledges of $1,000,000 or more each from three different donors.

Government sources provided $10,367,787 in general support for Zoological Park and Aquarium operations. New York City allocated nearly $8,000,000 through the Department of Cultural Affairs and New York State nearly $2,000,000 through the Natural Heritage Trust. The rest came from Federal sources. Additionally, the City committed $5,989,538 for capital improvements at the Zoological Park and Aquarium, continuing its outstanding partnership with private supporters of the Society. New exhibition construction and major renovation continued at an accelerated pace due to this collaborative effort.

Zoological Park and Aquarium combined attendance increased by more than 100,000 visitors to nearly 2,900,000. Admission revenues rose twenty-two percent at the Zoological Park and eighteen percent at the Aquarium. The Zoo's free admission policy on Tuesdays, Wednesdays, and Thursdays enabled fifty-seven percent of all visitors to enter without paying any admission fees.

Food, souvenir, transportation, and exhibit fees (visitor service revenues) rose fifteen percent to $9,483,933. A new record amount from this source, $2,205,000, was available to underwrite capital improvement costs. These funds provide seed money when private donors and government sources are identified for capital improvement programs.

With membership rolls increasing by more than 1,500 and membership fees by an average of thirty percent, total revenue from this source was $1,429,417, thirty-one percent more than last year. The rate increase, the first in fifteen years, met no resistance from the Society's long-term members. *Animal Kingdom* magazine brought its revenue up by $154,246 to more than $1,000,000. Individual subscribers now number more than 20,000, in addition to 130,000 members of the New York Zoological Society and thirty-eight other zoological societies around the country.

Endowment and other investment income provided nine percent of revenues. The annualized return on the Society's portfolio over the last six years has been 24.9 percent, ranking the Society portfolio in the top fifth percentile of such funds.

Personnel costs accounted for fifty percent of the Society expenditures. Conservation grants, new exhibit costs, and collection accessions represented fifteen percent. Purchased services, supplies, repairs, food, and forage accounted for twenty-three percent. Utilities, cost of goods sold for food and souvenir sales, and other expenses were twelve percent. A mild winter and lower fuel prices held utility costs level. Overall increases reflect the economy's lower inflation rate.

Capital expenditures covered a number of major projects. At the Zoological Park the new Himalayan Highland exhibition was substantially completed, with the opening scheduled for fall 1986. Design and engineering plans continued to be developed for the Zoo's cogeneration system. Renovation began on the Elephant House, and plans were developed for an adjoining amphitheater. Plans were completed and construction began on the family oriented Discovery Cove at the Aquarium. Design was also substantially completed for a new Sea Cliffs exhibit.

Construction begun in April 1985 at Central Park Zoo proceeded ahead of schedule. The new facility will open in 1988.

David T. Schiff
Treasurer

Putto and horse figures on the Zoo's seventeenth-century Italian fountain.

Two male Siberian tiger cubs, born in Wild Asia in April, are the first offspring of Alisa, on loan from the Soviet Union.

PEAT MARWICK

Peat, Marwick, Mitchell & Co.
Certified Public Accountants
345 Park Avenue
New York, NY 10154

The Board of Trustees
New York Zoological Society:

We have examined the balance sheet of New York Zoological Society as of June 30, 1986 and the related statements of support and revenue, expenditures, capital additions and changes in fund balances and of changes in financial position for the year then ended. Our examination was made in accordance with generally accepted auditing standards and, accordingly, included such tests of the accounting records and such other auditing procedures as we considered necessary in the circumstances.

As explained in note 1 to the financial statements, expenditures for land, buildings and equipment are not capitalized, and depreciation of buildings and equipment is, therefore, not recorded. Such practices are not in conformity with generally accepted accounting principles.

In our opinion, except for the effect on the financial statements of the matter discussed in the preceding paragraph, the aforementioned financial statements present fairly the financial position of New York Zoological Society at June 30, 1986 and the results of its operations and the changes in its financial position for the year then ended, in conformity with generally accepted accounting principles applied on a basis consistent with that of the preceding year.

Peat, Marwick, Mitchell & Co.

September 5, 1986

Ring-tailed lemurs were born at the Bronx Zoo in February (below) and the Wildlife Survival Center in May 1986.

New York Zoological Society
Balance Sheet
June 30, 1986

Assets	Operating funds	Endowment funds
Cash, including short-term investments of $4,418,879	$ 5,546,479	—
Investments (note 2)	26,284,069	27,976,313
Accounts receivable	499,516	—
Grants and pledges receivable	7,364,006	—
Inventories, at lower of cost or market	582,610	—
Prepaid expenses and deferred charges	1,567,005	—
	$ 41,843,685	**27,976,313**
Liabilities and fund balances		
Accounts payable and accrued expenses	2,929,437	—
Deferred restricted support and revenue (note 5)	19,149,871	—
	22,079,308	—
Fund balances:		
Unrestricted:		
Designated for long-term investment	17,414,608	—
Undesignated	2,349,769	—
Endowment:		
Income unrestricted	—	7,305,568
Income restricted	—	10,094,965
Term endowment—income unrestricted (note 3)	—	10,575,780
	19,764,377	27,976,313
	$ 41,843,685	**27,976,313**

See accompanying notes to financial statements.

Baby green turtle hatched at Tortuguero, Costa Rica.

Statement of Support and Revenue, Expenditures, Capital Additions, and Changes in Fund Balances
Year ended June 30, 1986

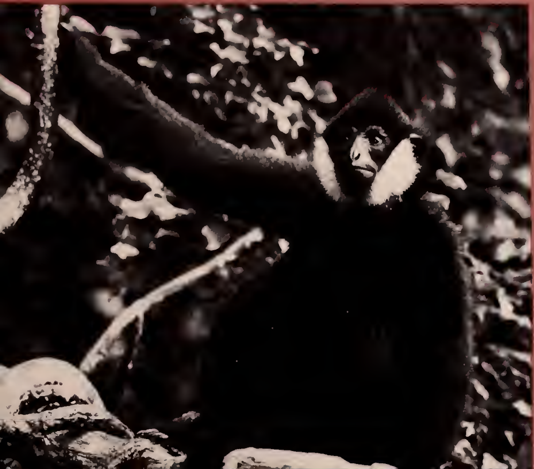
	Operating funds			
	General	**Capital**	**Total**	**Endowment funds**
Operating support and revenue:				
Contributions and fund raising events, net	$ 2,808,628	1,405,538	4,214,166	—
Government support:				
City of New York (note 8)	7,994,073	—	7,994,073	—
Other	2,373,714	—	2,373,714	—
Admission charges	3,886,412	—	3,886,412	—
Visitor services revenues	7,278,933	2,205,000	9,483,933	—
Membership dues	1,429,417	—	1,429,417	—
Endowment and other investment income	2,486,400	539,572	3,025,972	—
Publications and related revenues	1,040,442	—	1,040,442	—
Education program revenues	253,676	—	253,676	—
Collection sales	—	85,598	85,598	—
Miscellaneous revenue	232,832	—	232,832	—
Total operating support and revenue	**29,784,527**	**4,235,708**	**34,020,235**	—
Expenditures:				
Program services:				
Zoological Park	18,070,096	2,379,821	20,449,917	—
Aquarium	3,667,089	837,138	4,504,227	—
Survival Center	230,742	—	230,742	—
Wildlife Conservation International	1,459,250	—	1,459,250	—
Marine Sciences	453,081	—	453,081	—
Publications	1,113,993	—	1,113,993	—
Membership activities	701,026	—	701,026	—
City Zoos project (note 7)	—	1,018,749	1,018,749	—
Total program services	**25,695,277**	**4,235,708**	**29,930,985**	—
Supporting services:				
Management and general	2,655,988	—	2,655,988	—
Fund raising	1,504,816	—	1,504,816	—
Total supporting services	**4,160,804**	—	**4,160,804**	—
Total expenditures	**29,856,081**	**4,235,708**	**34,091,789**	—
Excess of expenditures over operating support and revenue, carried forward	**(71,554)**	—	**(71,554)**	—

(continued)

Statement of Support and Revenue, Expenditures, Capital Additions, and Changes in Fund Balances (cont'd.)

	Operating funds			
	General	**Capital**	**Total**	**Endowment funds**
Excess of expenditures over operating support and revenue, brought forward	$ (71,554)	—	(71,554)	—
Bequests	778,061	—	778,061	—
Realized net gains on investments	1,819,881	—	1,819,881	—
Excess of support and revenue over expenditures before capital additions	2,526,388	—	2,526,388	—
Capital additions:				
Contributions (note 3)	—	—	—	4,278,270
Realized net gains on investments	—	—	—	2,647,825
Total capital additions	—	—	—	6,926,095
Excess of support and revenue over expenditures after capital additions	2,526,388	—	2,526,388	6,926,095
Fund balances at beginning of year	17,237,989	—	17,237,989	21,050,218
Fund balances at end of year	$ 19,764,377	—	19,764,377	27,976,313

See accompanying notes to financial statements.



Male white-cheeked gibbon in JungleWorld.

This baby white-handed gibbon, born on September 3, 1985, was the second offspring of Holly (below) and Jonesy on their Cope Lake islands.

Statement of Changes in Financial Position
Year ended June 30, 1986

	Operating funds	Endowment funds
Resources provided:		
Excess of support and revenue over expenditures before capital additions	$ 2,526,388	—
Capital additions:		
Contributions	—	4,278,270
Realized net gains on investments	—	2,647,825
Excess of support and revenue over expenditures after capital additions	2,526,388	6,926,095
Items which do not provide resources—realized net gains on investments	(2,918,241)	(2,647,825)
Decrease in grants and pledges receivable	2,994,497	—
Increase in deferred restricted support and revenue	669,913	—
Total resources provided	3,272,557	4,278,270
Resources used:		
Increase in accounts receivable	150,493	—
Increase in inventories	90,870	—
Increase in prepaid expenses and deferred charges	880,664	—
Decrease in accounts payable and accrued expenses	570,755	—
Purchase of investments, net of sales of $25,473,736	3,114,251	148,183
Return to term endowment funds (note 3)	(4,130,087)	(4,130,087)
Total resources used	676,946	4,278,270
Increase in cash	**$ 2,595,611**	—

See accompanying notes to financial statements.

Notes to Financial Statements
June 30, 1986

(1) Summary of significant accounting policies

The financial statements of the Society have been prepared on the accrual basis except for depreciation as explained below. Other significant accounting policies follow:

Fund accounting

In order to ensure observance of limitations and restrictions placed on the use of available resources, the accounts are maintained in accordance with the principles of fund accounting. This is the procedure by which resources for various purposes are classified for accounting and reporting purposes into funds established according to their nature and purposes. Separate accounts are maintained for each fund; however, in the accompanying financial statements, funds that have similar characteristics have been combined into fund groups.

(continued)

The assets, liabilities and fund balances of the Society are reported in two self-balancing fund groups:

Operating funds, which include unrestricted and restricted resources:

—Unrestricted funds represent the funds available for the support of Society operations.

—Funds restricted by the donor, grantor, or other outside party for particular operating purposes (including accessions and other capital additions) are deemed to be earned and reported as revenues of operating funds when the Society has incurred expenditures in compliance with the specific restrictions. Such amounts received but not yet earned are reported as deferred restricted support.

Endowment funds, which include the following restricted resources:

—Funds that are subject to restrictions of gift instruments requiring in perpetuity that the principal be invested and only the income be used.

—Term endowment funds which must be held intact except that, at some future date or specified occurrence, some portion or all of the principal may be used (see note 3).

Plant assets and depreciation

Plant acquisitions including buildings and improvements constructed on land owned by the City of New York are not capitalized and, accordingly, depreciation is not recorded in the Society's financial statements. Major expenditures for buildings and improvements are reflected as capital expenditures in the accompanying financial statements.

Collections

Expenditures for collections are not capitalized.

Other matters

All gains and losses arising from the sale, collection or other disposition of investments and other noncash assets are accounted for in the fund that owned the assets. Ordinary income from investments, receivables, and the like is accounted for in the fund owning the assets, except for income derived from investments of endowment funds, which is accounted for, if unrestricted, as revenue of the unrestricted operating fund or, if restricted, as deferred amounts until the terms of the restriction have been met.

Enforceable pledges for operating purposes, less an allowance for uncollectible amounts, are recorded as receivables in the year made. Pledges for support of current operations are recorded as operating fund support. Pledges for support of future operations are recorded as deferred amounts in the operating fund. Pledges to the endowment funds are recognized upon payment of the pledge.

(2) Investments

Investments are reflected at cost or fair market value at date of gift. The market value and carrying value of investments by fund at June 30, 1986, were as follows:

	Market value	Carrying value
Operating funds—expendable	$36,180,479	26,284,069
Endowment funds—nonexpendable	39,158,292	27,976,313
	$ 75,338,771	**54,260,382**

Details of investment assets at June 30, 1986, were as follows:

	Market value	Carrying value
Cash	$ 564,194	564,194
Short-term investments	16,163,250	16,119,833
Corporate stocks	49,311,164	28,782,570
U. S. Government obligations	9,300,163	8,793,785
	$ 75,338,771	**54,260,382**

(continued)

Investment assets of endowment funds and operating funds are pooled on a market value basis with each individual fund subscribing to or disposing of units on the basis of the value per unit at market value, determined quarterly. Of the total units, each having a market value of $258.74, 151,339 units were owned by the endowment funds and 139,831 units were owned by operating funds at June 30, 1986. The average earnings per unit, exclusive of net gains, approximated $10.49 for the year.

The following tabulation summarizes changes in relationships between carrying values and market values of investment assets:

	Market value	Carrying value	Net gains (losses)	Market value per unit
End of year	$ 75,338,771	54,260,382	21,078,389	258.74
Beginning of year	55,805,874	45,431,882	10,373,992	218.96
Unrealized net gains for year			10,704,397	
Realized net gains for year			5,566,066	
Total net gains for year			**$ 16,270,463**	**39.78**

(3) Term endowment (Animal Kingdom Fund)

During 1976, the Society initiated a capital funds campaign. The campaign included a term endowment fund to serve various functions, as described below, subject to the following conditions:

(a) The income of the term endowment fund shall be used for the general operating purposes of the Society; and

(b) The principal of the term endowment fund may be expended only upon the affirmative vote of two-thirds of the Trustees present at any duly held meeting of the Board of Trustees or its Executive Committee: (i) to finance programs or improvements to facilities (i.e., the Zoological Park, the New York Aquarium, or other facilities of the Society) to produce revenue or increase attendance; or (ii) to ensure the survival of the Society if funds from other sources fail to provide sufficient revenue to maintain the Society's programs; provided, however, that in the case of any contribution to the term endowment fund which was subject to a restriction not to expend the principal of such contribution without the prior consent of the donor thereof, in addition to the vote of the Trustees described above, such consent must be obtained in writing prior to the expenditure of such principal.

Restricted Funds

In prior years, term endowment funds were utilized to finance certain capital projects. Subsequently, contributions restricted to finance these projects were received by the Society. Accordingly, $4,130,087 of such funds were returned to the term endowment fund during the year ended June 30, 1986.

(4) Pension plan

All eligible Society employees are members of the Cultural Institutions Retirement System's (CIRS) Pension Plan. Pension expense was approximately $973,000, of which approximately $451,000 was financed by an appropriation from the City of New York. The current year's provision includes amortization of prior service costs over a period of 30 years commencing June 30, 1974. The Society's policy is to fund pension cost accrued and no unfunded vested benefits existed as of June 30, 1985, the date of the latest plan valuation.

Because the CIRS Plan is a multi-employer plan, certain information as it relates to vested and non-vested benefits as well as plan assets is not readily available.

(continued)

(5) Deferred restricted support and revenue

The changes in deferred restricted support and revenue for the year ended June 30, 1986, are as follows:

Balance at beginning of year	$ 18,479,958
Additions:	
Contributions and fund raising events	7,003,423
Fees and grants from governmental agencies	426,252
Investment income	1,097,079
Net gains on investment transactions	1,098,360
Other	115,303
	28,220,375
Less:	
Funds expended during year	4,940,417
Funds returned to term endowment (note 3)	4,130,087
Balance at end of year	**$ 19,149,871**

(6) Collections

During the year ended June 30, 1986, animal collection accessions aggregated approximately $248,000 while deaccessions aggregated approximately $86,000.

(7) City Zoos Project

The Society and the City of New York have entered into agreements with respect to the Central Park Zoo, Prospect Park Zoo, and Flushing Meadows Zoo. Each agreement provides for the City's renovation of these zoos in accordance with plans developed through consultation with the Society and approved by the City, and thereafter, for the Society's operation and management of each with funding from the City, for an initial 50-year term, renewable by the Society for five additional 10-year terms. Except for the Central Park Zoo, the Society will expend no monies for construction. The Society has committed approximately $15,000,000 toward design and renovation costs at the Central Park Zoo, of which $5,400,000 has been expended through June 30, 1986.

(8) City of New York support

The Department of Cultural Affairs of the City of New York, in addition to providing general operating support, has reported to the Society that during fiscal 1986 it expended $5,990,000 at the Zoological Park and the Aquarium for capital improvements. Such expenditures are not included in the accompanying financial statements.

Humpback whales near Hawaii are the subject of WCI research.

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Sable antelope calf examines Chairman of the Executive Committee at the Wildlife Survival Center in Georgia.

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In order to help the Society avoid future administrative costs, it is suggested that the following paragraph be added to any restrictions that are imposed on a bequest:

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President

Cover:
This Guam rail chick, one of fourteen hatched at the Bronx Zoo since 1984, illustrates the possibilities of cooperative captive breeding to save endangered species from extinction. Most of Guam's twenty-five bird species are either extinct or near extinction, due primarily, it seems, to the predation of a tree snake, introduced on the island after World War II. In 1984, several pairs of two of the endemic species—Guam rails and Guam kingfishers—were brought to the United States for breeding at the Philadelphia Zoo, the National Zoo's Conservation and Research Center at Front Royal, Virginia, and the Bronx Zoo. The program's success has encouraged hope that the two species might one day be reintroduced on their native island. (Photo by William Meng, New York Zoological Society)

New York Zoological Society
Bronx Zoo
Bronx, New York 10460